THE IRON TRADE REVIEW

Volume XLII CLEVELAND, MARCH 19, 1908 Number 12

NEW EQUIPMENT

WILL BE BUILT BY A NORTHWESTERN RAILROAD.

Continued Activity of Tin Plate and Wire Plants.—Pig Iron Dull.—Government Contracts.

The awarding of contracts by the national government and municipalities and the buying of wire, tin plate and other products manufactured by interests more or less directly connected with the farmers, continue to be the main support of the market, but the decision of the Chicago, Milwaukee & St. Paul railroad to begin the building of 2,500 stock cars and 70 locomotives at its Milwaukee shops is an encouraging indication of increased railroad activity. In some finished lines, especially structural material and malleable castings, there is a rather surprising number of small orders, and in many cases prompt delivery is insisted upon. The activities of the Steel Corporation show a slight increase, and some of the large independent interests report orders for the first half of March amounting to fully 10 per cent more than for the first half of February. The Steel Corporation is continuing the new construction ordered last year and other improvements are being approved, but appropriations for the whole year have not yet been considered.

Tin Plate and Wire

The American Sheet & Tin Plate Co. expects to have 76 per cent of its total capacity in operation next week, only 5 per cent less than the capacity in operation one year ago. The demand from canners and other large consumers is heavy, and in wire products there is also a very active demand.

Railroad Buying

The building of the new equipment by the Chicago, Milwaukee & St. Paul railroad will require a considerable tonnage of billets, steel underframes, gray iron and malleable castings and boiler tubes. Buying by railroads during the week has not been heavy, but we note the sale of 25,000 kegs of spikes.

Finished Material

Bids for the lock of the ship canal at Black Rock harbor, near Buffalo, involving 7,000 tons of sheet piling, were opened Saturday, and the contract will in all probability be awarded to the McArthur Bros. Co., of New York City, one of the bidders for the digging of the Panama canal. Some contracts for fair sized tonnages of structural material have been awarded, a large part of the business going to independent interests, and a considerable number of new projects will probably be carried out at a not far distant date. A gradual improvement is shown in sheets, and the capacity in operation is gradually increasing.

Pig Iron Very Quiet

The pig iron market continues dull, and no sales of importance have been made. Considerable southern iron has been sold on a basis of $12.00 Birmingham for No. 2, but sales have also been made at a higher figure. In the central west, the new schedule is being generally adhered to, but some interests are making concessions without succeeding in taking many orders.

Coke and Old Material

The coke market is weak and there is very little activity. The fear of a strike of coal miners has had little effect. The old material market is not active and prices are irregular.

LARGEST CONTRACT

EVER AWARDED FOR STEEL SHEET PILING.

Bids on Walls for Ship Lock to be Built Near Buffalo.—New York Firm Makes Lowest Proposal.

Bids were opened March 14 at Buffalo by Lieut. Col. W. L. Fisk, United States engineer, for the construction of the walls for the proposed ship lock in Black Rock harbor, Buffalo. The government estimate of the cost of the work was $1,100,000. The contract will undoubtedly be awarded to McArthur Bros. Co., New York City, its bid being $822,302.85 with steel used for quoins, and $823,304.45 with granite used for quoins. The contract for steel sheet piling calls for 6,910 tons and is the largest contract ever awarded for sheet piling. The proposals of the six bidders show a wide diversity. The accompanying table gives an abstract of the proposals except for the following, on which the bids of the McArthur Bros. Co. were:

Clay filling, 45 cents per cubic yard; clay banking, 35 cents per cubic yard; pumping and maintenance, $8,000; excavation, 19 cents per cubic yard; handling material by derrick, bucket measure, 40 cents per cubic yard; dredging channel, scow measure, 16 cents per cubic yard; concrete 74,000 cubic yards, $4.37 per cubic yard; mooring posts, $40 each; mooring cleats, $25 each.

Bids for pumping and maintenance ranged from $50,000 to $8,000, and the bids on concrete from $7.31 to $4.37.

With good luck and no extraordinary delays at Washington, it is expected that the ship canal lock will be ready when the work of deepening and widening the Black Rock harbor has reached that point.

Locally, the whole project is known as the Niagara ship canal, and it involves carving a canal 23 feet deep and 200 feet wide at its narrowest point through the flint rock bottom from the Erie basin to just below Squaw island.

Work on the canal has now progressed

(Continued on page 533.)

THE WEEK IN IRON CENTERS

PITTSBURG.

Activity in Tin Plate, Wire and Merchant Pipe—Optimistic Feeling.

Office of THE IRON TRADE REVIEW,
510 Park Bldg., Mar. 17.

That pleasant weather conditions play their part in promoting a more cheerful spirit among business men and to that degree improve the general commercial state, finds illustration this week in the iron and steel situation in the Pittsburg district. An optimistic sentiment, more general in expression than has prevailed for a number of weeks, is noted and there is a more marked inclination to make the best of things, as they really exist, and to courageously lend aid to the support of the market.

But there are more than sentimental reasons for the increase of confidence in the whole market. Certain commodities, notably tin plate, wire products and merchant pipe, are maintaining their positions of increasing demand and more active mill operations, and the effect is a beneficial one for all lines. The especially favorable outlook in tin plate is shown in the declaration of the American Sheet & Tin Plate Co. that it expects to have 76 per cent of its total capacity in operation next week, compared to 81 per cent at this date one year ago. Though the tin trade may not be regarded as a true index to the movement of the entire iron and steel industry, it remains a bright spot, which is attracting attention in general business circles, and is exerting an influence for the common good. The same may be said of wire products and will be of merchant pipe if the present improvement in this line is upheld.

Other indications point to the gradual return of a more normal business volume. Tonnage from this district, handled by the leading railroad systems, is showing a larger percentage of gain in the first half of March over February than the latter month did over January. Large independent interests report a substantial increase in total business taken to this date in March, which, if continued, will put their operations upon a 50 per cent or better basis by April 1, a gain of at least 10 per cent over February. Other large independents have received the best average daily tonnage in specifications in the past 10 days since five months ago and are much encouraged. The leading producer in this district has the same number of furnaces in blast as for several weeks past, and has in operation about 50 per cent of its finishing capacity.

Pig Iron.—The past week has done nothing in the way of proving the strength of the present pig iron market and it has only tended to illustrate the wide range of prices at which foundry grades are moving. At least two sales of No. 2 iron were closed in the week at better than $17 delivered, with the freight rate, not exceeding 90 cents, absorbed. One of these was for 200 tons for second quarter delivery which went at $17 western Pennsylvania furnace, or $17.80 at the consumer's works. The other was for 75 tons at $17.25 delivered, not to Pittsburg, but to a point taking the same freight, 90 cents from the valley furnace making the sale. Other sales at better than $17 delivered are reported, as well as some transactions on the $17 delivered Pittsburg basis. On the other hand, no less than four furnaces, three in the valleys and one without, have displayed a willingness to accept business at $16.90 delivered, or 10 cents under the Cleveland schedule. Some have been willing, as resuts have shown, to make the concession greater. We note several sales in the past ten days aggregating 200 tons, at $15.75 valley furnace or $16.65 delivered Pittsburg. No sales at less than this figure, however, have been heard of in the week. In southern iron, some scattering deals to northern territory, not Pittsburg, have been closed at $12.50, Birmingham. There is but very little inquiry or business being closed for Bessemer. The sale of a carload of chilled cast iron, in broken pigs, at $18.25 furnace is reported. The sand-cast market is about $17 furnace, but there are reports that this has been shaded in small lots. Shenango No. 3 furnace, which has been banked, blew in on Bessemer, March 17, making five furnaces in the valleys in blast, two on Bessemer, two on foundry, and one on low phosphorus. In basic, there is a little more stir on the inquiry side, the American Rolling Mill Co., of Middletown, O., being in the market for 3,000 tons for May and June delivery. There have been but few sales and the market continues about $16, valley furnace. Due to an increase in the releases of suspended shipments, Bessemer and basic stocks in the valleys were diminished by about 4,000 tons in the week from March 9 to 16. Low phosphorus iron is showing more strength, and we note sales of 210 tons carrying a 90-cent freight rate at $24.75 delivered, and of another small lot at $24.50 delivered, under the same conditions. We continue to quote the following prices on northern iron for either prompt or second quarter deliveries:

Bessemer, valley	$17.00 to 18.00
Bessemer, Pittsburg	17.90 to 18.90
No. 1 foundry, Pittsburg	17.40 to 17.90
No. 2 foundry, Pittsburg	16.50 to 17.00
Gray forge, Pittsburg	15.90 to 16.15
Basic, valley	16.00 to 17.00
Basic, Pittsburg	16.90 to 17.90

Ferro-Manganese.—The ferro-manganese market is in an unsettled state because of the aggressiveness of some sellers in quoting low prices. There is considerable inquiry from this territory. We quote Pittsburg prices, which are being shaded, at from $45.50 to $46.50, for 80 per cent foreign manganese, on prompt shipment from European ports.

Imported 50 per cent ferro-silicon is quoted $83 Pittsburg on forward deliveries; domestic 12 per cent, $29; 11 per cent, $28; 10 per cent, $27. The lower grades of imported ferro-silicon are quoted 50 cents higher. These quotations are applicable to Pittsburg territory.

We note the sale of a carload of ferro-manganese, containing 22 to 24 per cent phosphorus at about $75 delivered Pittsburg.

Plates.—Outside of the special lines of plate consumption represented by steel car and boat construction, specifications from the general trade show a shade of improvement. Steel car companies will have soon taken out their full tonnage, and the prospects for their making any large contracts for material in the immediate future, are not very promising. The development of riveted pipe contracts, in the east, which will require a large tonnage of plates, is being watched with interest. Shading of prices by small mills continues. We continue to quote as follows:

Tank plate, ¼ inch thick, 6¼ to 100 inches, 1.70c f. o. b. mill Pittsburg. Extras are as follows per 100 pounds. Boiler and flange steel plates, 0.10c; A. B. M. A. and ordinary fire-box steel plates, 0.20c; still bottom steel, 0.30c; marine steel, 0.40c; locomotive fire-box steel, 0.50c; all sketches, excepting straight taper plates varying not more

than 4 inches in width at ends, narrowest end not being less than 30 inches, 0.10c; circles, 0.20c. Plates in width over 100 inches up to 110 inches, 0.05c; over 110 inches up to 115 inches, 0.10c; over 115 inches up to 120 inches, 0.15c; over 120 inches up to 125 inches, 0.25c; over 125 inches up to 130 inches, 0.50; over 130 inches, 1c. Gages under ¼ inch to and including 3-16-inch plate on thin edges, 0.10c; under 3-16 to and including No. 8, 0.15c; under No. 8 and including No. 9, 0.25c. Five cents extra for less than carloads. Terms, net cash in 30 days.

Sheets.—A gradual improvement in sheets finds illustration in the increasing activity of the mills of the leading interest. The percentage of operations in the past week was 44, as against 40 the previous week, the gain being made by scattering additions of active mills in different works. The independents are also enjoying the improvement, the La Belle Iron Works having started some sheet mills this week. We quote:

Black steel sheets, one pass, cold rolled: Nos. 11-12, 2.10c; Nos. 13-14, 2.15c; Nos. 15-16, 2.20c; Nos. 17-21, 2.25c; Nos. 22-24, 2.30c; Nos. 25-26, 2.35c; No. 27, 2.40c; No. 28, 2.50c; No. 29, 2.60c; No. 30, 2.70c. Galvanized: Nos. 10-11, 2.45c; Nos. 12-14, 2.55c; Nos. 15-16, 2.65c; Nos. 17-21, 2.80c; Nos. 22-24, 2.95c; Nos. 25-26, 3.15c; No. 27, 3.35c; No. 28, 3.55c; No. 29, 3.70c; No. 30, 3.95c. Blue annealed: No. 11-12, 1.85c; Nos. 13-14, 1.90c; Nos. 15-16, 2c. Corrugated roofing, $1.75 per square for No. 28 painted, 2½-inch corrugation, and $3.10 per square on galvanized roofing, 2½-inch corrugation, No. 28.

Tin Plate.—A very satisfactory condition exists at present in tin plate, the seasonable demand by canners and other large consumers approaching closely to the normal tonnage. The American Sheet & Tin Plate Co. started up 10 mills this week at its Sharon Works, making its total capacity in operation 71 per cent against 67 per cent last week. Ten additional mills at the Sharon works and several other mills will be put on next week, bringing the active percentage to 76. A year ago at this time, the leading interest was running 81 per cent of its mills. Similar conditions prevail among the independents. We quote:

Coke tin plate, 100-pound basis, 14 x 20, $3.70 f. o. b. mill, Pittsburg district. Terms, 30 days, less 2 per cent for cash in 10 days.

Rails and Track Material.—Rail business the past week has been without any developments of note, no transactions in standard sections being reported. In light rails, about 500 tons were disposed of by the local maker. The official schedule of prices is being cut by rerolling mills, but it is denied that any concessions are being made on light rails rolled from billets. Mill operations are unchanged. On present specifications on Bessemer rails, we quote as follows:

Fifty-pound and heavier, 500-ton lots and over, $28; carloads and less than 500 tons, $30; less than carload lots, $32; 8-pound, $36; 12-pound, $32; 16-pound, $30; 20-pound, $29; 25 to 45-pound, $28; angle splice bars for standard sections, $1.65; standard spikes, $1.75 to $1.80 Pittsburg; hand spikes, $1.95 to $2.05 Pittsburg.

Steel.—Billets are quiet and a light tonnage is being booked. No reports of shading in prices are now heard. In sheet and tin bars, due to the activity of tin plate, and to some improvement in sheets, contracts being taken are more plentiful and there is some good business under negotiation. The sheet bar mill of the Youngstown Sheet & Tube Co., which has been idle because of an accident to the engine, is expected to resume the latter part of this month. We continue to quote $28, Pittsburg, on Bessemer and open-hearth billets and $29.50 on sheet and tin bars, to Pittsburg, valley and Wheeling territory and $29 Pittsburg, for delivery to other points.

Hoops and Bands.—The hoop and band market is very quiet at the present time, but the situation among the coopers is reported to be promising, and the outlook for new business for the mills is not unsatisfactory. Prices are firm. We continue to quote the following official prices:

Hoops in carload lots, 2c; in less than carload lots, 2.10c; bands, 1.60c; base half extras as per standard steel.

Merchant Bars. — After several weeks of moderate improvement, steel bars are showing less activity and specifications of the past week have not been of the expected tonnage. The bar iron trade also shows little change, but there is a trifle better inquiry. Reports are to the effect that the $1.50 price is being generally maintained. There is a little shading in steel specialties. We continue to quote:

Common iron bars, 1.50c Pittsburg in carload lots and over; 1.50c in less than carloads; 1.47c to 1.50c base Pittsburg plus freight to point of shipment on western deliveries; Bessemer steel bars, 1.60c; plow and cultivator, 1.60c; channels, angles, zees, tees, under 3 inches, 1.70c, all f. o. b. Pittsburg. The following differentials are maintained on steel: Less than 2,000 pounds, 0.10c advance; less than 1,000 pounds of a size, 0.30c advance. Cold rolled and ground shafting, 56 per cent in carloads, and 48 per cent in less than carloads, delivered in base territory; open-hearth spring steel, 2.25c to 2.50c; sleigh shoe flats, 1.60c to 1.65c; smooth finished machinery steel, 1.90c to 2c; toe calk, 2.10c to 2.15c. Planished and machine straightened tire steel is 1.80c base. Iron finished tire under 1½ by 1½ inches, 1.75c; iron finished tire, 1½ by ½ inches and over, 1.60c base. All tire subject to ½ extra on the steel card.

Structural Material.—Not much improvement is shown in structural lines, although there is a slight change for the better in the releasing of some projects from architects' boards and in industrial construction. A few small bridges constitute the interest of the railroads in this market. The enlargement of the Fort Pitt hotel in this city will require about 1,200 tons and the C. B. & Q. railroad has an inquiry out for 1,000 tons for track elevation work in Chicago. In their eagerness to keep their shops in operation, fabricators continue to quote low prices. We continue to quote:

Beams and channels, 15-inch and under, 1.70c; over 15 inches, 1.85c; zees, 1.70c; tees, 1.75c; angles from 3 to 6 inches, 1.80c; universal and sheared plates, 6¼ inches and wider, 1.80c base.

Merchant Pipe.—A distinct improvement in merchant pipe developed in the week and this has been shared equally by the principal producer and the independent mills. Jobbers' stocks are in a somewhat depleted state now that active consumption demand is being made upon them and the result has been noted in increased specifications and orders. Business for some makers for the first half of March has gained about 15 per cent over the corresponding period in February. A number of good-sized inquiries are being given attention by the mills and these have developed that prices on both iron and steel pipes are being firmly held. Spang-Chalfant & Co., Inc., began operations this week in their large mill at Etna, Pa., making sizes up to 24-inch. We continue to quote the following official discounts of the principal producer to consumers in large lots, with an additional one point and five off to jobbers:

	Black.	Galv.
⅛ and ¼ inch	65	49
⅜ inch	67	53
½ inch	69	57
¾ to 6 inches	73	63
7 to 12 inches	70	55
EXTRA STRONG PLAIN ENDS.		
⅛ to ⅜ inch	58	46

⅛ to 4 inches	65	53
4½ to 8 inches	61	49
DOUBLE EXTRA STRONG PLAIN ENDS.		
⅛ to 8 inches	54	43

Boiler Tubes.—The demand for boiler tubes is not heavy, but prices are being firmly maintained. We quote the following discounts:

	Iron.	Steel.
1 to 1½ inch	42	47
1¾ to 2¼ inch	42	59
2½ inch	47	61
2¾ to 5 inch	52	65
6 to 13 inch	42	59

2¼ inches and smaller, over 18 feet, 10 per cent net extra.
2¾ inches and larger, over 22 feet, 10 per cent net extra.

Wire Products.—Increasing briskness in the wire trade, is being manifested as the spring season draws nearer. Specifications in all products of the mills are excellent, nails, barb wire and plain wire moving equally well. The demand for fencing for the farming districts is steady. Prices are firm. We quote:

Wire nails, jobbers carload lots, $2.05; retailers carload lots, $2.10; less than carloads, $2.15; painted barb wire, $2.20 for jobbers in carloads; retailers in carloads, $2.25; and less than carloads, $2.35, with 30c for galvanizing; plain wire, 1.90c for jobbers, and 1.95c by carload.

Rods.—We quote nominally $35 Pittsburg, on Bessemer rods and $36 Pittsburg on open-hearth.

Coke.—The production of coke in the week ending March 1 with 17,090 active ovens was 158,824 tons, a small gain over the preceding week when the capacity in operation was 16,720 ovens and the production 157,982 tons. The market shows little change. The orders being taken, particularly in foundry coke, are for small lots and urgent shipping instructions, usually accompany them. We quote the general market on standard foundry coke for prompt shipment at from $2.25 to $2.50 ovens although prices as low as $2 ovens have been done in small lots of some grades. Our furnace coke quotations are from $1.70 to $1.80, ovens. Sales are noted both above and below these figures, in the former case the coke being low in phosphorus and in the latter, on the inferior grades.

Old Material.—The old material market is again in a lifeless state. There is no buying of any consequence by the mills and dealers are showing no inclination to force the demand by offering material at sacrifices. The railroad offerings are much lighter than usual. Some country scrap is appearing on the market. We quote the following nominal prices, gross tons, delivered in the Pittsburg district:

Heavy melting scrap, $12.75 to $13.25; re-rolling rails, $14 to $14.25; bundled sheet scrap, $9.50 to $10; iron axles, $18.50 to $19.50; old iron rails, $15 to $16; No. 1 wrought scrap, $13.50 to $14; old car wheels, $15.50 to $16; low phosphorus scrap, $16 to $16.50; machine shop turnings, $8.50 to $9; cast borings, $7.75 to $8.25; No. 1 cast scrap, $14.75 to $15.25.

The Pittsburg offices of Walter-Wallingford & Co., will be moved April 1 from the Farmers' Bank building to new quarters which the company has taken in the Peoples' Bank building, Fourth and Wood streets.

The Mark Mfg. Co., Chicago, operating tube mills at Zanesville, O., and Evanston, Ill., has opened a local sales office at 510 Park building, Pittsburg, in charge of B. F. Bechtel. The general offices remain in Chicago.

CHICAGO.

Cars and Locomotives to Be Built—Improved Demand for Structural Material.

Office of THE IRON TRADE REVIEW,
1362 Monadnock Block, Mar. 17.

Because there will be required billet steel, steel underframes and malleable iron in quantities unknown to this market for some time past, the immediate building of 2,500 stock cars and 70 large engines by the Chicago, Milwaukee & St. Paul railroad is probably the most interesting feature of the week's developments. Other railroad buying included the purchase of 25,000 kegs of spikes divided among three western roads. The outlook for building structurals resumed its hopeful appearance with the closing of contracts for about 2,000 tons, with another 12,000 tons in immediate prospect and with work started on such long delayed projects as the Milwaukee auditorium. The expected placing by the government of the contract for 7,000 tons of sheet piling for Buffalo harbor also had a stimulating effect. The demand for light and heavy section rails was dull and there is even less interest in plates. Sheets and wire products are in the midst of a seasonal demand and are moving actively as compared with the remainder of the market in response to a fairly general buying. Interest in bars both iron and steel, particularly the latter, is at a low ebb. It is freely predicted that prior to the making of annual contracts in midsummer steel bar prices will be modified to bring them more in keeping with the situation. In fact, the need of the protection afforded by the upholding of prices to many interests carrying stocks of high priced steel is rapidly disappearing. The scrap market is dull and weak. The purchase of 2,000 tons of foundry iron by a stove manufacturer stood out with considerable prominence among the pig iron transactions. Inquiry was improved and a feeling was manifest that a better tonnage situation was not unlikely. Present pig iron prices are neither definite nor firmly established and opinion generally leans toward further reductions of slight amount.

Pig Iron.—Most important among the pig iron transactions of the week was the purchase of 2,000 tons by the Moore Bros. Co, Joliet, Ill., stove manufacturer. The iron was of standard foundry quality and was sold by the Dayton Coal & Iron Co. Delivery is to extend over the second, third and fourth quarters. For this reason it was difficult to obtain a flat price on the iron, as the majority of interests in this market refuse to take orders for iron to be delivered in the last quarter and half at less than $13.50 Birmingham and are not anxious for any considerable tonnage at that figure. A number of other sales in lots from 50 to 400 tons were made, with southern iron bringing from $12.50 to $13 and northern iron $17.50 depending on quantity and delivery. We quote this week a slightly lower level of prices for pig iron not because it is possible to lay one's finger any more definitely upon sales of iron for less than the quotations of a week ago, but as a necessary accompaniment of an undeniably weaker situation from the standpoint of price. Based upon what No. 2 iron could be bought for in the proper quantity, for the proper delivery and from the proper sources there should be no hesitancy in quoting $12 for southern iron at Birmingham and $17.35 for northern iron delivered. With standard northern No. 2 selling at $17.35 delivered, there still remains a differential of 50 cents in favor of $12 southern iron delivered to consumer at Chicago, switching charges included, and as $17.35 is absolutely the minimum price at which market sales have been made, there seems to be no necessity to make a better price than $12.50 Birmingham in this territory for ordinary sales. It would not be surprising, however, to witness in this territory another cleaning up of immediate needs with offerings of iron in unlimited tonnage at a figure 50 cents under the market. On the other hand, quotations submitted on the general inquiries in the market, and such inquiries were more numerous and substantial in the past week, run pretty uniformly at $13

with favorite brands and last half deliveries commanding as high as $13.50. Speculation as to the trend of the market in the next few weeks is sufficiently diversified to cover almost every possible condition: We quote:

Lake Superior Charcoal	$21.50 to 22.00
Northern Foundry No. 1	17.85 to 18.35
Northern Foundry No. 2	17.35 to 17.85
Northern Foundry No. 3	16.85 to 17.35
Southern Foundry No. 1	17.35 to 17.85
Southern Foundry No. 2	16.85 to 17.35
Southern Foundry No. 3	16.35 to 16.85
Southern Foundry No. 4	15.85 to 16.35
Southern No. 1 Soft	17.35 to 17.85
Southern No. 2 Soft	16.85 to 17.35
Southern Gray Forge	15.35 to 15.85
Southern Mottled	15.10 to 15.60
Southern Silveries, 4 per cent Silicon	18.85 to 19.35
Southern Silveries, 5 per cent Silicon	19.35 to 19.85
Southern Silveries, 6 per cent Silicon	20.35 to 20.85
Jackson Co. Silveries, 6 per cent	21.90 to 22.40
Jackson Co. Silveries, 8 per cent	23.90 to 24.40
Jackson Co. Silveries, 10 per cent	25.90 to 26.40
Malleable Bessemer	18.00 to 18.50
Standard Bessemer	19.40 to 19.90
Alabama Basic	17.35 to 17.85

Billets and Rods.—The decision of the Chicago, Milwaukee & St. Paul railroad to build 2,500 stock cars and 70 locomotives at its Milwaukee shops will mean the purchase of considerable quantities of billets, steel underframing, gray and malleable iron castings, iron and steel in various forms and boiler tubing. About 2,500 tons of billets will be required for the car axles and it is understood that the Bettendorf Axle Co., of Davenport, Ia., will furnish a considerable portion of the finished steel work. Otherwise the users of billets continue to confine their purchases to small lots. We quote for Chicago delivery, rolling billets, $31; forging billets, $33. We quote f. o. b. Pittsburg, Bessemer wire rods, $35; open-hearth rods, $36; chain rods, $37.

Merchant Bars.—The general buying from store during the past week showed a marked increase over the like period preceding and on Monday of the present week the indications were decidedly for a continuance of this activity. Steel bars were one of the particularly active products. The bar mills of the Corporation at Milwaukee are all in operation. The local iron bar mills were running throughout the week and expect to start again before the close of this week. Machinery and tire steel have been noticeably in demand among the other shapes, but agricultural interests are running with low stocks and are buying only in small quantities. Reports are still current of discounts of 5 and 10 per cent off the regular quotations for shafting. We quote for Chicago delivery from mill in carload lots as follows:

Bar iron, 1.65c to 1.68c; soft steel bars and bands, 1.78c, half extras; soft steel angles, less than 3 x 3, 1.88c; hoops, 2.18c base, full extras; planished or smooth finished tire steel, 1.98c; iron finish, up to 1½ x ½ inch, 1.93c base tin card; iron finish 1½ to 1½ inch and larger, 1.78c base, steel card; channel for solid rubber tire, ¾ to 1 inch, 2.28c, and 1⅛ inch and larger, 2.18c; smooth finished machinery steel, 2.18c; flat sleigh shoe, 1.83c; concave and convex sleigh shoe, 1.93c; cutter shoe, 2.36⅛c; toe calk steel, 2.33c; railway spring, 1.98c; crucible tool steel, 7c to 9c, with higher prices asked on special grades. Quotations on shafting are 54 per cent off the list for carload lots, and 48 per cent off for less than carload lots. On iron and steel bars from local stocks, we quote as follows: Bar iron, 2.10c, full extras; soft steel bars, $2 per 100 pounds base, plus half extras; soft steel hoops, 2.40c; full extras.

Plates.—With new construction requiring plates for vessel and car building at a standstill, the plate situation remains without actual or prospective improvement. Except for the limited amount of shading on plates of small size, prices are without change and we quote:

Plates, ¼-inch and heavier, 6¼ to 100 inches wide, either universal or sheared, 1.88c to 1.91c Chicago. For extras see Pittsburg report. Jobbers' prices for shipment from local stocks are as follows: Tank steel, ¼-inch and heavier, up to 72 inches wide, 2.10c to 2.20c; from 72 to 96 inches wide, 2.20c to 2.30c; 3/16-inch up to and including 60 inches wide, 2.20c to 2.25c; 72 inches wide, 2.45c to 2.55c. No. 8 up to 60 inches wide, 2.20c to 2.25c. Flange and head quality, 25c extra.

Sheets.—The buying of sheets from store and the shipments from mill in about the same volume constitute one of the comparatively active features of the market. This is in part a seasonable demand and is aided by the feeling that the reductions in prices of sheets made some time ago placed them on a desirable basis for buyers. Prices are firmly held. For mill prices, see Pittsburg report. We quote for Chicago delivery from store on carload lots and less as follows:

No. 10, 2.20c to 2.25c; No. 12, 2.25c to 2.30c; No. 14, 2.30c to 2.35c; No. 16, 2.40c to 2.50c; Nos. 18-20, 2.60c to 2.65c; Nos. 22-24, 2.65c to 2.70c; No. 26, 2.70c to 2.75c; No. 27, 2.75c to 2.80c; No. 28, 2.85c to 2.95c; No. 30, 3.25c. Galvanized sheets, Nos. 10 to 16, 3.05c to 3.15c; Nos. 18 to 20, 3.15c to 3.25c; Nos. 22 to 24, 3.30c to 3.35c; No. 26, 3.50c to 3.55c; No. 27, 3.70c to 3.75c; No. 28, 3.90c to 4.00c; No. 30, 4.40c to 4.50c.

Structural Steel.—The letting of contracts for structural material last week indicated a return of interest in building construction. Inquiry for highway bridges was also good. The steel for the construction work of the Raymond Lead Co., Chicago, amounting to 387 tons was awarded to the South Halsey St. Iron Works of this city. The American Bridge Co. took the contract for 526 tons for the building to be erected in San Francisco by the Barron estate and also took an aggregate of about 900 tons on miscellaneous orders. The work on the auditorium at Milwaukee, it has recently been decided, will now be pushed with vigor. The steel amounting to 1,700 tons, will be furnished by the Worden-Allen Co., of Milwaukee. There are also contracts in prospect of immediate placement involving about 3,000 tons for a new 18-story building in Seattle, about 1,000 tons for a St. Louis cathedral and about 1,000 tons for new construction by a metal refining company. From 6,000 to 8,000 tons of steel will be required for the dozen or so postoffices which are to be built or enlarged in the near future. The list of these includes Columbus, O.; Youngstown, O.; Flint, Mich.; South Bend, Ind.; Kewanee, Ill.; St. Paul, Minn.; Colorado Springs, Colo.; Houston, Tex.; Tacoma, Wash.; Grand Rapids, Mich.; Des Moines, Ia., and Devil's Lake, North Dakota. Of these, the Tacoma, Wash., building will probably need the most steel, the amount required being in the neighborhood of 1,500 tons. Prices on fabricated steel are very near rock bottom and contracts have been placed as low as $49.75 per ton of erected material. We quote mill prices for plain structurals as follows:

Beams and channels, 3 to 15 inches inclusive, 1.88c to 1.91c delivered Chicago. For extras see Pittsburg report. Quotations from store are as follows for carload lots and over:

All angles, 3 inches and larger, including 6 inches, $2.05 per 100 pounds; angles, over 6 inches, $2.15 per 100 pounds base; beams, 3 to 15 inches inclusive, $2.05 per 100 pounds base; channels, 3 inches and larger, $2.05 per 100 pounds base. Less than carload lots are $1 a ton higher than foregoing prices.

Rails and Track Supplies.—Recent orders for standard section rails do not call for larger than 100, 200 and 300-ton lots, but are in sufficient volume

with the principal producer to permit running the rail mill at South Chicago for the present. The light rail sales were of the same character, but prices in the lighter sections are being shaded from $3 to $4 a ton. Three of the large western roads were heavy buyers of spikes, taking an aggregate of 25,000 kegs. Of this one of the northern transcontinental railways took 5,000 kegs, the other 12,000 kegs and 2,000 kegs of bolts in addition. The Chicago, Burlington & Quincy also took 5,000 kegs of spikes. We quote prices unchanged, as follows:

Standard rails, $28 f. o. b. mill, full freight to destination; light rails, 25-pound to 45-pound, $28; 20-pound, $29; 16-pound, $30; 12-pound, $31. Track supplies, f. o. b. Joliet, angle bars, 1.65c; spikes, 1.85c to 1.95c; track bolts, with square nuts, 2.35c to 2.45c; with hexagon nuts, 2.50c to 2.60c. Small railroad and square boat spikes, 2c base, f. o. b. Pittsburg.

Merchant Pipe and Boiler Tubes.—Aside from the fact that there was a greater volume of boiler tubing buying and a general increase of interest in tubular goods, the week was featureless.

We quote mill discounts, Chicago delivery, carload lots, as below. On steel pipe jobbers are allowed a concession of one point and 5 per cent additional from the schedule in force:

	—Steel— Black.	Galv.
¼ to 6 inches, inclusive....	71.2	61.2

BOILER TUBES.

	Steel.	Iron.	Seamless.
2¼ to 5 ins., inclusive..	63.2	50.2	49.2

Mill quotations on iron pipe are five points higher than the foregoing prices.

We have revised our prices from store, as below. A concession of one-half to one point from these prices is allowed by Chicago jobbers on carload orders shipped from local stocks. We quote for less than carload lots as follows:

MERCHANT PIPE.

	Black.	Galv.
⅛ to ¼ inch.....	64	48
⅜ inch	66	52
½ inch	68	56
¾ to 6 inches	72.5	62
7 to 12 inches.....	68	53

Store prices for wrought iron pipe, carload lots, from Chicago stocks, are as follows: One-eighth to ¼-inch, 59; ⅜-inch, 61; ½-inch, 63; ¾-inch to 6 inches, 68; 7 inches to 12 inches, 65. Boiler tubes from store are unchanged as follows:

	Steel.	Iron.	Seamless.
1 to 1¼ inches.....	35	35	35
1¾ to 2¼ inches.....	50	35	35
2½ inches	52½	35	35
2¾ to 5 inches.....	60	47½	47½
6 inches and larger....	50	35	..

Cast Iron Pipe.—The only large letting reported for the coming week is one at Cincinnati where 2,000 tons are to be placed. Of the contracts let last week, the Lynchburg foundry took 700 tons at Grand Rapids, Mich., the Massillon Iron & Steel Co., 250 tons at Fort Wayne, and the United States Cast Iron Pipe & Foundry Co. 900 tons of 24-inch at Columbus, O., and also about 200 tons at Milwaukee. The volume of small inquiries has been heavy and practically up to the routine of a year ago, but large lettings are very few. Prices remain as a week ago and we quote: 4-inch pipe, $30; 6 to 12-inch, $29; larger sizes, $28; gas pipe, $1 a ton higher.

Wire Products.—The wire mills are probably running a larger percentage of their capacity at this time than they will through the remainder of the year, according to the present outlook. Orders for the mills of the principal producer average now about 4,000 tons daily, of which approximately half is new business and half specifications on old contracts. In one day last week, orders for 4,300 tons were received. This condition should last until close to June 1. The coarse products are the most active and fencing goods are in demand. The manufacturing trade is the slowest department. Prices are without change and we quote to jobbers Chicago delivery:

Wire nails, $2.23; painted barb wire, $2.38; galvanized barb wire, $2.68; smooth annealed wire, $2.08; smooth galvanized wire, $2.38; polished staples, $2.23; galvanized staples, $2.63. Carload lots to retailers, 5 cents higher; less than carload lots, 15 cents higher.

Coke. — The coke situation lost strength in the week under review and prices are such as to induce oven interests to plan marketing the coal in the east, shutting down the ovens on foundry coke. We quote Connellsville standard foundry coke at $2.30 and furnace coke $1.75 at the ovens.

Old Material.—The scrap market was weak beyond all question. Opinion is divided regarding a further slump in prices, but actual evidence is all in favor of continued lowering of values, particularly in stove plate and cast scrap. No. 1 railroad wrought sold at $11 and $11.25, though not in large quantities, and old iron rails are reported as having brought only $15.25. Country scrap has not accumulated in any quantity, but there is a plethora of railroad material. The offerings from the railroads last week included a list from the Baltimore & Ohio containing 5,000 tons, of which 2,200 tons were re-rolling rails, 1,650 tons from the Missouri Pacific, and a very small list from the Wisconsin Central. We have revised our prices and quote gross tons in the first paragraph as follows:

Old car wheels	$15.75 to 16.25
Old iron rails	15.25 to 15.75
Re-rolling rails (3 ft. and over)	12.25 to 12.75
Old steel rails (3 ft. and under)	12.25 to 12.75
Light section relayers, 45 lbs. and under, subject to inspection	21.00 to 23.00
Relaying rails, subject to inspection	19.00 to 19.50
Frogs, switches and guards	11.75 to 12.25
Heavy melting steel	11.50 to 12.00

We quote, net tons, as follows:

No. 1 R. R. wrought	$11.00 to 11.50
No. 2 R. R. wrought	10.00 to 10.50
Knuckles, couplers and springs	10.75 to 11.25
Shafting	13.50 to 14.00
Iron car axles	16.75 to 17.25
Steel car axles	15.50 to 16.00
Dealers' forge No. 1	9.00 to 9.50
Pipes and flues	8.50 to 9.00
No. 1 cast, 150 lbs and less	12.00 to 12.50
No. 1 mill	8.00 to 8.50
Mixed busheling (Nos. 1 and 2)	7.75 to 8.25
Country sheet	5.25 to 5.75
No. 1 boiler cut	7.00 to 7.50
Boiler punchings	10.00 to 10.50
Cast borings	4.75 to 5.25
Mixed borings, etc	4.75 to 5.25
Machine shop turnings	6.50 to 7.00
Railroad malleable	10.00 to 10.50
Agricultural malleable	9.50 to 10.00
Stove plate and light cast scrap	10.00 to 10.50
Old iron splice bars	14.00 to 14.50

CLEVELAND

Pig Iron Very Dull—Small Orders for Structural Material.

Office of THE IRON TRADE REVIEW,
Browning Building, Mar. 17.

Iron Ore.—Vessel capacity to move about 500,000 tons of coal has been chartered by Cleveland shippers at the same carrying charges as those of last year, 30 cents from Ohio points to the head of Lake Superior and 40 cents to Milwaukee. Including the tonnage previously taken by hard coal shippers at Buffalo, vessel capacity to about 1,600,000 tons of coal has been contracted for. Ore shippers are, however, showing no disposition to contract and it is not probable that they will do so in the near future, as no inquiries are coming from furnace interests. On base ores with the guarantee of 55 per cent on old range and Mesabi Bessemer, and 51.50 per cent on old range and Mesabi non-Bessemer, we quote as follows: Old range, Bessemer, $5; Mesabi Bessemer, $4.75; old range non-Bessemer, $4.20 and Mesabi non-Bessemer, $4.

Pig Iron.—Business is at a standstill and the outlook is discouraging. Sellers who are adhering to agreed prices are taking no orders and those who are making concessions are doing little better. We quote, Cleveland delivery, charcoal iron being based on water freight rates, as follows:

Bessemer	$17.90 to 18.90
No. 1 foundry	17.85
No. 2 foundry	17.35
No. 3 foundry	16.85
No. 2 southern	16.85 to 17.35
Gray forge	16.00 to 16.85
Lake Superior charcoal	22.00 to 23.00

Coke.—Even the danger of a strike

of coal miners has not stimulated buying, and sales are very few. We quote high grade spot foundry coke at $2.30 to $2.50 at the ovens, and spot furnace coke at $1.70 to $1.80.

Finished Material.—Numerous orders for very small tonnages of structural material are being received, but there is no large business in sight. In sheets, business seems to be rather better than in other lines. The demand for bar iron is very limited, and Cleveland mills are not now in operation. Some inquiries for light rails are pending. Manufacturers of fire escapes report a marked increase in orders since the Collinwood fire. Some jobbers report improvement in the movement from stock.

Old Material.—As had been anticipated somewhat last week, the large offerings of general material by railroads tended to soften the market. Another fair-sized list which closes this week has aroused considerable interest because of possibilities of prices which have continued to be almost entirely nominal. Cast material maintains its price, while wrought material has dropped some points. Several changes have been made in quotations, which are f. o. b. Cleveland, and are still nominal:

Old iron rails	15.50 to 16.00
Old steel rails (re-rolling)	13.00 to 13.50
Old steel rails (under 6 feet)	12.25 to 13.25
Old car wheels	16.00 to 16.50
Old steel boiler plate	9.25 to 10.25
Steel axles	14.50 to 15.00
Malleable iron (railroad)	12.25 to 13.25
Malleable iron (agricultural)	10.25 to 11.25
Heavy steel	11.25 to 12.25
Country mixed steel	11.00 to 12.00
Low phosphorus	14.75 to 15.50

We quote, net tons, as follows:

No. 1 R. R. Wrought	11.25 to 12.25
No. 1 busheling	10.50 to 11.00
No. 1 machine cast	12.50 to 13.00
Iron axles	16.25 to 17.25
Axle turnings	7.00 to 7.50
Machine shop turnings	6.50 to 7.00
Grate bars	9.25 to 10.25
Pipes and flues	10.00 to 11.00
Tank iron	8.25 to 9.25
Hoop and band iron	5.25 to 6.25
Sheet iron	4.25 to 5.25
Wrought drillings	6.50 to 7.00
Stove plate	10.25 to 11.25
Cast borings	5.00 to 6.00

NEW YORK.

Stronger Tone of Pig Iron—Structural Orders Taken by Independents.

Office of THE IRON TRADE REVIEW,
Room 1005, No. 90 West St., Mar. 17.

Pig Iron.—While transactions, for the most part, are still confined to small lots for early shipment, substantial evidence is at hand that the improvement in this district is reaching the tangible stage. A large selling house reports that during the first half of March its sales were in excess of those made during all of February. Another concern has reason to expect that the present month's transactions will be heavier than during any of the nine preceding. A New Jersey stove manufacturer has closed for 3,000 tons, divided equally between northern and Virginia iron, for early delivery, and an inquiry is now pending from an up-state concern for close to 5,000 tons. Consumers are still unwilling to contract far into the future, but 500-ton inquiries and sales are much more frequent and the tone of the market is distinctly stronger. Philadelphia will this week be something of a pig iron Mecca, inasmuch as meetings will be held in that city Wednesday of both the Eastern Pig Iron Association and the special committee appointed to consider the question of shortages in shipments of pig iron and coke. So far as can be learned, the price level remains about the same. Sales of some fair-sized lots of malleable have been made this week on the basis of $17.75, delivered New York, and a good grade of gray forge has sold at $16.50. We quote, tidewater delivery, as follows:

Northern foundry No. 1	$18.50 to 19.00
No. 2X foundry	18.25
No. 2 plain	17.50 to 18.00
No. 2 southern foundry	17.50 to 17.75
Malleable	17.75 to 18.25
Basic	17.00 to 17.50
Gray forge	16.50 to 17.00

Ferro-Manganese. — Inquiries are pending for two lots aggregating 500 tons, with indications that these will be closed at an early date. There is no appreciable change in price, the level remaining at about $43 to $44, seaboard.

Finished Material.—Independent concerns have taken practically all structural contracts closed during the week, including a building at Broadway and Fourth street, 1,600 tons, and another at Forty-second and Fifth avenue; 1,000 tons, to the Hay Foundry, and a building in Seattle; 1,200 tons to Brown & Ketcham, and 1,000 tons on the St. Paul extension, divided between the Fort Pitt and Virginia Bridge & Iron Co. Bridge propositions involving limited tonnages are developing from a large number of eastern railway lines. The Northwestern will need additional tonnage and the St. Paul will continue its coast extension work. Excepting the last named, these undertakings are of the imperative sort, as financial difficulties are still holding up a large number of important projects.

There is still some irregularity in a number of finished lines. Steel bars, for instance, are increasingly firm and mills report a marked improvement in orders and specifications. The same holds good with plates, on which it develops that little, if any, shading can now be done, even on universals. One eastern mill catering to quick delivery business has canceled the balance unspecified on all contracts recently expired, in decided contrast with recent practice in this particular. On the other hand, bar iron prices are this week distinctly more ragged, at least two or three mills having offered a 1.40c, Pittsburg, base for eastern business. There is a meeting of the Eastern Bar Iron Association this week. No recent lettings of cast iron pipe are reported, though good tonnages are pending at Syracuse, Troy and other up-state points. New England requirements have apparently been disposed of. We quote:

Angles, 3 to 6 inches x ¼ inch and heavier, 1.86c; beams, 3 to 15 inches, 1.86c; tees, 3 x ¼ inch and heavier, 1.91c; plates, carloads, tanks, 1.86c; marine boilers, 2.26c; bar iron, 1.56c; soft steel bars, 1.76c; sheets, No. 28, black, 2.66c.

Old Materials.—The scrap market is featureless, with only about the usual run of hand-to-mouth business being transacted. Mills are running in somewhat better condition, but none as yet is operating full time and scrap purchases are still being made with much caution. We quote gross tons, New York delivery, as follows:

Old iron rails	$16.50 to 17.00
Old steel rails, re-rolling	14.50 to 15.00
Relaying rails	21.00 to 22.00
Old car wheels	16.50 to 17.00
Old iron car axles	17.00 to 17.50
Old steel car axles	16.00 to 16.50
Heavy melting steel	11.50 to 12.00
No. 1 railroad wrought	13.00 to 13.50
Iron track scrap	12.00 to 12.50
Wrought pipe	9.00 to 9.50
Cast borings	5.00 to 5.50
Wrought turnings	7.50 to 8.00
Heavy cast scrap	13.50 to 14.00
Railroad malleable	11.00 to 11.50
Agricultural malleable	10.00 to 10.50
Stove plate	10.00 to 10.50
Grate bars	9.50 to 10.00

CINCINNATI.

Some Increase of Melt—Sales of Basic and Foundry Grades.

Office of THE IRON TRADE REVIEW,
First National Bank Bldg., Mar. 17.

Pig Iron.—Indications continue to point to a slight increase in the melt in this territory, but trade is exceedingly quiet as new business is limited mainly to purchases of a hand to mouth character. The principal transactions reported were sales of about 3,000 tons of basic iron for May and June delivery to an Ohio consumer, 4,000 tons of foundry grades to cast iron pipe interests and one 500-ton lot of low grade foundry iron for prompt shipment. There is some inquiry for low phosphorous iron with one buyer inquiring for about 700 tons. An inquiry for 2,000 tons of gray forge for Pittsburg territory is under negotiation. A central Ohio manufac-

turer is asking prices on 500 tons of foundry iron for third quarter delivery, and an inquiry from Michigan calls for 750 tons of northern, 750 tons of southern and 400 tons of high silicon iron for deliveries commencing in May and running to September. The price situation remains about the same as a week ago, but the impression in the trade indicates an easy undertone to the market. Southern iron is obtainable in a limited way at $12 Birmingham for No. 2 foundry and both buyers and sellers recognize this quotation as minimum. The lower grades are more freely offered on the $12 basis, and sales of No. 3 foundry at $11.50; No. 4 foundry, at $11 and gray forge at $10.50 are more frequent than No. 2 foundry at $12. Northern iron is exceedingly quiet as the $16 basis in the Ironton district is too high to compete successfully with southern iron. The northern makers are practically at the cost line and the price making by southern producers is the interesting feature in reference to values. The above quotations are virtually minimum prices and sales of southern iron have been made in small quantitites at $12.50 Birmingham and in a few instances at $13, but it has been found that when attractive business of a good tonnage is involved the higher prices seldom obtain the order. We quote for prompt delivery and second quarter delivered Cincinnati, based on freight rates of $3.25 Birmingham and $1.20 from Ironton, as follows:

	PER TON
Southern foundry No. 1	$15.75 to 16.25
Southern foundry No. 2	15.25 to 15.75
Southern foundry No. 3	14.75 to 15.25
Southern foundry No. 4	14.25 to 14.75
Southern No. 1 soft	15.75 to 16.25
Southern No. 2 soft	15.25 to 15.75
Southern gray forge	13.50 to 13.75
Northern No. 1 foundry	17.70 to 18.70
Northern No. 2 foundry	17.20 to 18.20
Northern No. 3 foundry	16.70 to 17.70
Northern 8 per cent silicon	20.20 to 21.20

Finished Material.—Specifications of contracts continue moderate and involve current needs indicating light consumption. Retailers are making fair purchases and business from the stores is moderate. Less than carload orders are filled here at the following prices:

Bar iron, 1.75c; steel bars, 1.85c, one-half extras. In some instances, retailers are still asking 2.10c, full extras, from store on small lots for both iron and steel. Angles, 3 x 3 and over, 2.15c to 2.25c; beams and channels, 15 inches and under, 2.15c; small angles and architectural channels, 2c base; plates, ¼-inch and heavier, 2c; 3/16-inch, 2.10c; No. 8, 2.15c; sheets (blue annealed) No. 10, 2.25c; No. 12, 2.30c; No. 14, 2.35c; No. 16, 2.45c; box annealed sheets, Nos. 18 and 20, 2.65c; Nos. 22 and 24, 2.75c; Nos. 25 and 26, 2.80c; No. 27, 2.85c, and No. 28, 2.95c; boiler tubes, 62 per cent off base; turnbuckles, 45 per cent off; rivets, 3.15 base; cold rolled shafting, 50 per cent off list; steel tire, 2.05c base.

Coke.—Orders for foundry coke show a slight increase, but prices remain unchanged. Furnace coke is quiet. Quotations in the leading coke producing districts are as follows:

Wise county furnace coke	$1.75 to 2.00
Wise county foundry coke	2.25 to 2.50
Pocahontas furnace coke, prompt shipment	1.65 to 1.90
Pocahontas foundry coke	2.25 to 2.40
Connellsville furnace coke, prompt shipment	1.75 to 2.00
Connellsville foundry coke	2.25 to 2.50

Old Material.—Inquiry from melters does not improve and the market remains quiet with an easy undertone. Dealers have fairly good stocks. We quote dealers' prices here as follows:

Old No. 1 R. R. wrought, net tons	$12.00 to 12.50
Cast machine and fdy., net tons	12.50 to 13.50
Old iron rails, gross tons	16.50 to 17.50
Old steel rails (re-rolling) gross tons	12.50 to 13.50
Old short lengths, gross tons	12.50 to 13.50
Old iron axles, net tons	16.50 to 17.50
Heavy melting scrap, gross tons	13.00 to 14.00
Stove plate, net tons	10.50 to 11.50
Wrought turnings	5.50 to 6.50
Cast borings, net tons	4.50 to 5.50
Car wheels, gross tons	16.50 to 17.50

PHILADELPHIA.

Effect of Southern Competition Felt—Scrap is Weak.

March 17.

Pig Iron.—The market is so featureless that it seems a waste of time to dwell upon it at any length. New business continues very small, but there is a fair volume of inquiries, showing that many consumers contemplate purchases in the near future, and there is the usual dribbling in of little orders ranging from 10 tons up to 200. The latter are few, however, compared with those of smaller size. There is a vigorous effort being made to maintain prices in the face of offerings of Virginia iron at slight reduction. According to the understanding as to prices under which most of the eastern furnaces are now working, they are at liberty to meet this southern competition, but prices are already so close to actual cost, if not below it, that most producers refuse to make any concessions. Production in this territory has been somewhat increased by the blowing in last week of No. 1 furnace of the Warwick Iron & Steel Co., at Pottstown, which has been relined, and of the Keystone furnace of the Reading Iron Co. at Reading. The feeling continues hopeful, and the conviction grows that when the tide turns it is likely to come with something of a rush. Prices show no change, as follows:

No. 1X foundry	$18.75 to 19.25
No. 2X foundry	18.25 to 18.50
No. 2 plain	17.75 to 18.00
Standard gray forge	16.50 to 16.75
Basic	17.25 to 17.50
Low phosphorus	23.50 to 24.00

Finished Material.—There is a moderate amount of business in structural material, and plate mills are also operating at about half capacity, but there is no perceptible change for the better. Increased orders in one direction are likely to be offset by losses in another line, so that the situation is practically as it has been for several weeks. There is no indication as yet of any extensive railroad buying. Prices are well maintained at schedule figures.

Old Material.—Prices have weakened again under the lack of demand from the mills, and show several declines. Stove plates have been especially weak, showing a loss of $1.50 a ton. There is apparently no speculative activity, and the market is extremely dull. Quotations follow:

Old steel rails	$15.00 to 15.50
No. 1 steel scrap	13.25 to 13.75
Old steel axles	19.00 to 19.50
Old iron axles	20.50 to 21.50
Old iron rails	17.00 to 17.50
Old car wheels	17.00 to 17.50
Choice scrap R. R. No. 1 wrought	14.50 to 15.00
No. 1 yard scrap	13.50 to 14.00
Machinery scrap	15.00 to 15.50
Low Phosphorus scrap	18.00 to 18.50
Wrought iron pipe	12.00 to 12.50
No. 1 forge fire scrap	10.50 to 11.00
No. 2 forge fire scrap, ordinary	9.00 to 9.50
Wrought turnings	10.00 to 10.50
Axle turnings, heavy	10.50 to 11.00
Cast borings	8.50 to 9.00
Stove plates	11.50 to 12.00

BUFFALO.

Pig Iron Market Extremely Dull—Ship Canal Contract.

Office of THE IRON TRADE REVIEW,
932 Ellicott Square, March 17.

Pig Iron.—The market is the dullest that it has been at any time since the financial depression began and, as far as sales are concerned, exhibits an almost complete apathy. There is a considerable amount of inquiry out, but most of it is taken as merely for the purpose of feeling out the situation. No activity is expected now until there is a decided awakening in finished lines. Prices are nominally maintained. We quote f. o. b. Buffalo, as follows:

No. 1X foundry	$17.80 to 18.30
No. 2X foundry	17.30 to 17.80
No. 2 plain	16.80 to 17.30
No. 3 foundry	16.30 to 16.80
Malleable Bessemer	17.50 to 18.00
Gray forge	15.50 to 16.00
Charcoal	22.50 to 23.50

Finished Materials.—The McArthur Bros. Co. of New York was lowest bidder on the construction of the proposed government ship canal lock in the Niagara river at Black Rock Harbor, Buffalo, in which about 7,000 tons of sheet piling are to be used. Details of bids will be found elsewhere in this issue.

ST. LOUIS.

Pig Iron Orders Coming in Slowly—Stocking Coke by Foundrymen.

March 16.

Pig Iron.—Orders and inquiries were received in the St. Louis territory last week in about the same ratio as during the previous week. Not much business was booked, although more interest probably was shown by foundrymen for shipment over the first half of the year. The 5,000-ton inquiry for basic iron which has been on the market for the last two weeks was not placed, according to reliable information, nor could it be stated positively that the inquiries had been withdrawn. Our prices, f. o. b., Birmingham, to which $3.75 freight is to be added, follow:

No. 1 southern	$13.00 to 13.50
No. 2 southern	12.50 to 13.00
No. 3 southern	12.00 to 12.50
No. 4 southern	11.50 to 12.00

Coke.—There was not much interest manifested in contracting for coke last week over the first half of the year. Shipments came in freely and a number of foundrymen are stocking up with the idea of preparing for the strike which is expected to take place about the first of April. The best selected Connellsville 72-hour foundry coke is quoted at from $2.25 to $2.75 per ton, f. o. b. ovens, for both immediate and future shipment. Furnace coke is offered at from $1.50 to $2, Connellsville ovens. Virginia and West Virginia selected 72-hour foundry coke is offered at from $2.25 to $2.50 ovens for all deliveries. Furnace coke, 48 hours, is quoted at $1.75 to $2 and upward.

Finished Material.—Work was begun Saturday on wrecking the buildings at 204-6-8 North Eighth street, where a new building is to be erected by Charles Wall, treasurer of the Meyers Bros. Drug Co., at a cost of $60,000. The structure will have six stories ultimately, but for the present only two will be completed. The building will be of steel skeleton type of construction.

Old Material.—The market is still very dull, although dealers assert that there is some reason to feel hopeful. Our quotations follow:

Cast iron borings, free from foreign material, net ton	$ 5.00
Steel axle turnings, net ton	8.00
Steel railroad axles, net ton	14.00
Iron railroad axles, net ton	15.50
Miscellaneous steel scrap, gross ton	10.50
Cast iron borings (free) net ton	4.00
Old car wheels, gross ton	16.00
No. 1 railroad cast scrap, net ton	11.00
Heavy machinery cast, net ton	12.00
Stove plate and light cast, net ton	10.00
Sheet iron, net ton	4.00
No. 1 railroad wrought, net ton	12.00
Railroad malleable, net ton	11.50
Heavy melting steel, net ton	10.00

BIRMINGHAM.

More Hopeful Feeling in Pig Iron, But Consumers Hesitate.

March 16.

There is a more hopeful turn of mind in the pig iron market in the Birmingham district with the quotations remaining betwen $12 and $13 per ton, No. 2 foundry. The shipments are steadier, though small lots appear to be the rule. The indications point strongly to the consumers holding off just as much as possible in placing business until there shall be an improvement all around. Machine shops and foundries in this section of the country are not very active, smaller forces being given employment. The Republic Iron & Steel Co. has blown out No. 3 furnace at Thomas, near here, and No. 2 will be put in operation shortly. No. 1 furnace was started up just 10 days ago. It is announced that the Republic company will keep two of the three furnaces in steady operation.

The shipments are about equal to the production. The steel industry about Ensley, Tennessee Coal, Iron & Railroad Co., is the most active in the Birmingham district. There is no time being lost about the big plant with five of the six furnaces manufacturing basic iron in full blast.

It is given out in Ensley that the industries of the Southern Steel Co., the bankrupt corporation, will within 60 days be back in operation, this information having come direct from a member of the reorganization committee.

Much of the labor employed in the steel industries in and around Ensley is remaining right in the district in anticipation of a resumption of work. A visit to Ensley shows that much work is being divided up among the labor in order that the people can be cared for until the conditions improve and full work can be given to all.

BRITISH IRON MARKET

Improvement in Pig Iron Maintained —Small Stocks.

Office of THE IRON TRADE REVIEW,
Princes Chambers, Corporation St.,
Birmingham, Eng., March 7.

The improvement reported a week ago in pig iron has been maintained to an extent even beyond that exhibited by the higher prices. In fact, the state of the trade is the subject of a great deal of puzzled comment in iron trade circles. Although the finished trades continue dull, there is remarkable demand for pig iron, the result of which is shown in further depletion of stocks, the amount in store yesterday being 84,834 tons, while the quotation was 50s 10d ($12.44), an improvement of 2½d on the previous day, and showing a slight increase on the week. The shipments for February were 60 per cent above the average for the last 10 years, and the stock declined during the month by 12,474 tons. The shipments exceeded those of last year by 11 per cent. Although trade is supposed to be depressed on the continent, very heavy purchases have been made by Germany, Italy and France, and the increase in exports is more surprising, considering that not a ton was sent out either to America or Canada, and there are talks even of a corner in pig iron, a situation not at all impossible in view of the small stocks, and their continued reduction. It is thought that the further reduction of the bank rate to 3½ per cent will have a hardening effect, and with the recognized export season immediately in view, increased shipments are very likely. There is a better feeling in hematite, East Coast makers now quoting 59s ($14.44). The effect of the improvement was felt very decidedly on the Birmingham market on Thursday, practically all smelters resisting pressure for further concessions. In one case, an order for 500 tons was refused on this ground. As there has been hardly any falling off in foundry business, this class of iron retains its full strength.

There is an extending feeling that the bottom has been reached and a decided upward movement has set in.

METAL MARKET

NEW YORK.

March 17.

Copper.—A shade of improvement in feeling, based on the idea that some demand for domestic consumption may be expected, has held the price level firm during the week and even recorded a slight advance in practically all grades. There is still some buying for foreign account, but total transactions are not large. We quote: Lake, 12½c to 13c; electrolytic, 12¼c to 12¾c; casting, 12c to 12¼c. The base price for wire is 14½c and for sheets 17c to 18c.

Pig Tin.—The foreign market continues fairly firm, but in this country prices are slightly lower, spot metal being obtainable at 29½c, and futures down to 29c.

Pig Lead.—The market is unchanged.

There is still some pressure to unload on the part of speculators, but the price level remains at 3.65c to 3.75c, New York.

Spelter.—Galvanizing concerns seem to be well supplied, though consumption is increasing. We quote the market level at 4.60c to 4.65c, New York.

Antimony.—Eagerness to unload has sent prices down again to the following level: Cookson's, 8¾c to 9¼c; Hallett's, 8½ to 9c; ordinary brands, 7¾c to 8¼c.

ST. LOUIS.

March 16.

Lead and Zinc.—The price paid for ore last week was $40.50 on a base price of $37 a ton of 60 per cent zinc, ranging down to $35 for the poorer grades. A price of $50 per ton was paid for lead ore, heavy purchases being made by a local company following an effort to reduce the price to $49 a ton. Approximately 500 tons were purchased by the local company.

The shipment of 4,500 tons of zinc during the week was less than the output, but as several good producing mines have been closed down and the owners of others are contemplating a similar move, it is not improbable that the output will be decreased.

If all that talk of closing down carry out their plans, the average output probably will be decreased about 1,500 tons. Many mines now in operation are not making a profit at the present prices for zinc and lead, and a few are said to be losing money. The smelters are paying more than they can afford with the spelter market as weak as it is now reported.

CHICAGO.

March 17.

Without recording any very satisfactory increase in the volume of transactions the past week exhibited a much stronger tone in the metal market. The conditions are fluctuating and the pulse is weak when most active. Sales of copper in small quantities locally did not reflect price advances made in New York on tonnages. Tin was carried upward at the end of the week and we have revised our prices. Spelter, lead and zinc continue stationary.

Lake copper, 14c to 14¼c; casting, 13½c to 13¾c; pig tin, 32½ to 33c; spelter, 5c to 5.10c; pig lead, desilverized, 4c to 4.10c in 50-ton lots; corroding, 4.60c to 4.75c in 50-ton lots; car lots, 2½c per 100 pounds higher; sheet zinc, 7c list, f. o. b. LaSalle, in car lots of 600-pound casks; Cookson's antimony, 12½c to 13c; other grades, 12c to 12½c.

A more active demand for scrap metals prevailed. Copper, brass and tin prices advanced and we quote to dealers as follows:

Copper wire, 11c; heavy copper, 11c; light copper, 10¼c; heavy red brass, 10c; heavy yellow brass, 8c; light brass, 6c; No. 1 red brass borings, 8¼c; No. 1 yellow brass borings, 7c; brass clippings, 8c; tea lead, 2⅞c; lead scrap, 3½c; zinc, 3¼c; tin pipe, 25c; tin foil, 21c; pewter, 16c; electrotype plates, free from wood, 3¾c; electrotype dross, 2½c; stereotype plates, 4¼c; stereotype dross, 2⅞c; prime slab zinc dross, $62 per ton.

REPORT OF CRUCIBLE STEEL CO. OF AMERICA.

At a meeting of the directors of the Crucible Steel Co. of America this week, it was decided to postpone action on the preferred stock. The rate for the last quarter of 1907 was 1 per cent, and the stock calls for 1¾ per cent quarterly. The deferred dividend owing stockholders is now 19⅝ per cent.

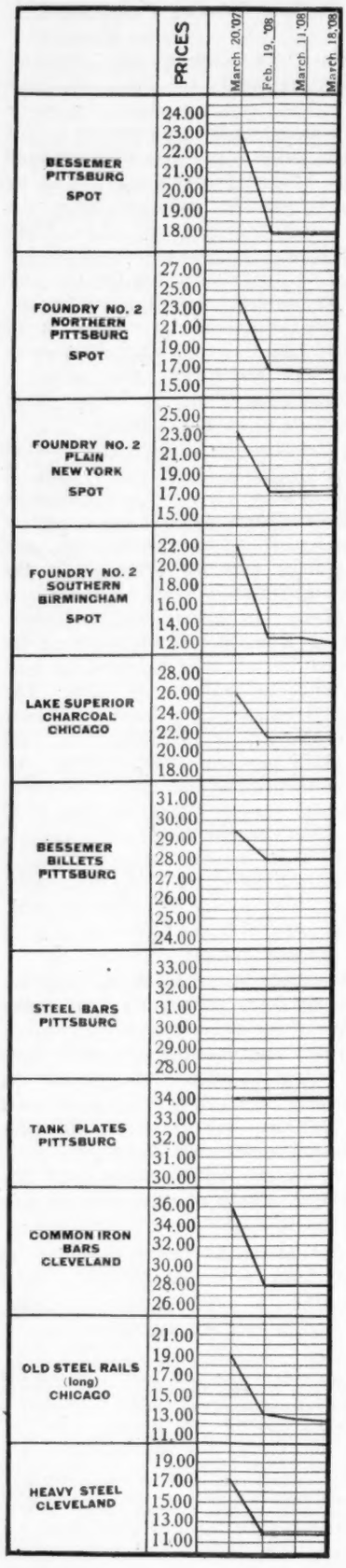
The financial statement for the half year ending Feb. 29, 1908, showing profits and losses from operations after charging all expenses thereto, including those for repairs and maintenance of plants, interest and fixed charges, follows:

September, 1907, profit		$139,356.06
October, 1907, profit		174,202.73
Total		$313,558.79
November, 1907, loss	$13,865.48	
December, 1907, loss	56,729.40	
January, 1908, loss	23,070.13	
February, 1908, loss	42,324.86	
		135,989.87
Net profits, six months		$177,568.92
Add income from investments		2,400.00
Total income		$179,968.92
Reserve for contingencies		5,836.01
Net income for half year		$174,132.91
Amount charged off in adjustments of inventory values of raw and process materials:		
November, 1907	$108,569	
December, 1907	225,685	
January, 1908	66,065	
February, 1908	25,973	
	$426.292	
Dividend No. 21	244,365	
Total deductions		$ 670,567.00
Deficit for half year		496,524.09
Surplus, Aug. 31, 1907		$2,457,283.81
Surplus, Feb. 29, 1908		1,960,759.72
Decrease		$ 496,524.09
Unfilled orders, Aug. 31, 1907		101,910 tons
Unfilled orders, Feb. 29, 1908		76,621 tons
Decrease		25,289 tons

The condition of the company's plants has been fully maintained, $265,246.39 having been charged against the operations of the six months.

The Union Steel Casting Co., Pittsburg, last week doubled its capacity in operation, and is now running daily two heats of 55,000 pounds each. The company had been running upon one heat daily since December.

PRICE CHART.



CORDIAL CO-OPERATION

Was Keynote of Meeting of Manufacturers' Association of Pittsburg.

More co-operation for the common good of Pittsburg's manufacturing interests, was the keynote sounded in the addresses delivered at the annual meeting and dinner of the Manufacturers' Association of Pittsburg held at the Hotel Duquesne Friday evening, March 13. One hundred members of the association and their guests, numbering many of the leading men in the industrial life of the city, were in attendance.

The banquet was marked by a spirit of good fellowship and of congratulation over the work accomplished by the association. It was the general sentiment, however, that there were opportunities for greater results to be attained, and this was fitly set forth in the president's address by F. H. Zimmers, of the Union Foundry & Machine Co. Mr. Zimmers, besides extending felicitation to the membership on the record of things done by the association, urged the manufacturers to continue alive in their interest and plans for the advancement of their common good. Marion C. Reinhart, of the Pittsburg White Metal Co., was introduced as the toastmaster of the evening, and he in turn presented the speakers of the occasion. A. E. McClintock, of Detroit, commissioner of the National Founders' Association, outlined the work accomplished by that organization the past year, and Robert Wuest, of Cincinnati, commissioner for the National Metal Trades Association, in a similar vein touched upon the association which he represents. Isaac W. Frank, president of the United Engineering & Foundry Co., also responded.

From beginning to end, the banquet manifested the friendly relations which the manufacturers of Pittsburg bear to each other, and from a social standpoint alone, the gathering was one of the most successful in the history of the organization.

The officers of the Manufacturers' Association of Pittsburg are as follows: President, F. H. Zimmers, Union Foundry & Machine Co.; vice president, Wm. H. Hamilton, Rosedale Foundry & Machine Co.; treasurer, Biddle Arthurs, Simonds Mfg. Co.; secretary, Walter B. Averman; councillors, F. W. Gerdes, Hall Steam Pump Co., W. J. Carlin, Thos. Carlin's Sons Co., C. C. Smith, Union Steel Casting Co., Thos. Fawcus, Fawcus Machine Co.

Those in Attendance.

Among those present at the banquet were the following:

H. A. Reed, M. J. McMurchy—Baird Machinery Co.
W. J. Carlin, Thos. McBride—Thos. Carlin's Sons Co.
Louis B. Fulton, D. A. Ralston—Chaplin-Fulton Mfg. Co.
John N. Early, Jas. S. Early—W. J. Early & Sons.
Thos. Fawcus—Fawcus Machine Co.
H. C. Shaw—A. Garrison Foundry Co.
F. W. Gerdes—Hall Steam Pump Co.
Saml. Heppenstall, C. W. Heppenstall—Heppenstall Forge & Knife Co.
E. W. Heyl—Heyl & Patterson, Inc.
W. R. Schuchman—Homestead Valve Mfg. Co.
Edward Kerr—Lawrenceville Bronze Co.
Jos. Farwell, Wm. McFadden, Messrs. Hart, Bauris, Haslam, McMillen, Tracey, Horne, Fawell and Schreck—Mackintosh, Hemphill & Co.
Geo. Marshall—Marshall Brothers.
A. W. Berger, Richard Muse—Marshall Foundry Co.
W. H. McKenna, C. H. McKenna—McKenna Bros. Brass Co.
C. W. Mesta—Mesta Machine Co.
J. H. Nusser—National Gear Wheel & Foundry Co.
G. P. Rhodes—Pennsylvania Casting & Machine Co.
John McLaren, W. J. Phillips—Phillips & McLaren Co.
O. S. Pulliam—Pittsburg Steel Foundry.
M. C. Reinhart—Pittsburg White Metal Co.
Mr. Powers, S. E. Maxwell—Powers-Maxwell Foundry Co.
Wm. Hamilton—Rosedale Foundry & Machine Co.
John Jackson, Biddle Arthurs—Simonds Mfg. Co.
H. M. Wilson, W. G. Benninghoff—Taylor-Wilson Mfg. Co.
F. H. Zimmers—Union Foundry & Machine Co.
C. C. Smith, J. L. Uhler—Union Steel Casting Co.
August Snyder—Wilson-Snyder Mfg. Co.
I. W. Frank, Edward Kneeland, C. E. Satler, W. R. Tener, Louis Voelker, G. W. Knotts and J. O. Barnett—United Engineering & Foundry Co.
A. E. McClintock — Commissioner National Founders' Association.
Robert Wuest—Commissioner National Metal Trades Association.
N. W. Dingwall, W. A. Bole, W. B. Averman, M. S. Zortman, H. M. Williamson—Brown & Zortman.
J. Miller—American Foundry & Construction Co.
G. Jurry—American Locomotive Works.
John T. Brown, Wm. Klee—Damascus Bronze Co.
L. W. Frank—Duquesne Steel Foundry Co.
H. P. Gazzam—H. P. Gazzam Machine Co.
L. S. Carson—*Industrial World.*
John A. Penton, W. B. Robinson, C. J. Stark—The Iron Trade Review.
Robt. A. Walker—*Iron Age.*
Jas. Lathwood.
Wm. McKinsey—Pittsburg Construction Co.
F. J. Curtis—Pittsburg Machine Tool Co.
E. G. Mueller—Reinforced Brazing & Machine Co.
F. M. Bowman—Riter-Conley Mfg. Co.
Henry Spilker—Sterrit-Thomas Foundry Co.
Thos. Rees—Jas. Rees & Sons.
W. H. Tranter—Tranter Mfg. Co.
E. A. Kebler—Matthew Addy & Co.

Joined Ends of Big Bridge.—Thursday, March 12, the ends of the Blackwell's Island bridge across the East river, New York, were joined by a temary pathway of steel girders and the first workman crossed over the new structure. Four panels are still to be put in place, however, and a couple of weeks will be required for this work. The bridge span, from tower to tower, is 1,182 feet, and the entire is 8,230 feet in length. It is double decked and will have cost, when completed, close to $20,000,000.

NEW FACTORY

For Ft. Wayne, Ind.—Resumption of Work at Various Plants.

Indianapolis, March 16.—The Black Automobile Co., organized a few days ago at Ft. Wayne, is preparing to ask bids for the erection and equipment of a large automobile factory in that city. Marion Black is president of the company.

The National Press & Printing Co. has been organized and incorporated here with $200,000 capital and will manufacture a new four-color printing press invented by G. K. Henderson, of this city. The company will soon order equipment for its new plant, which it purposes to have in operation by August 1. Directors are G. K. Henderson, J. K. Bain, C. C. Kuhn and William McBeath, all of this city.

Broderick & Quinlan, boiler manufacturers, Muncie, have resumed with a full force of employes. The plant shut down for about three months, but has been working with a partial force for several weeks.

Reeves & Co., farm machinery manufacturers, added 50 men to the force at Columbus last week and is now employing about 400 men.

Large Contract Awarded.—The James McNeil Bros. Co., Pittsburg, has been awarded the contract by the Pittsburg Steel Co. for the stacks and flues to be installed in connection with extensive improvements that the latter company is making to its plant at Monessen, Pa. The contract calls for the furnishing of flues, ranging in diameter from 5 to 8 feet for 51 gas producers, as well as eight self-supporting steel stacks 12 feet 6 inches at the bottom diameter and 175 feet high for the open-hearth furnaces, and five self-supporting steel stacks 7 feet bottom diameter and 100 feet high for the soaking pit furnaces. The erection work has already been started and is to be finished by June 1. The plates for the contract amounting to about 800 tons will be furnished by the Carnegie Steel Co. The McNeil company has also taken the order for cooling towers 10 feet in diameter and 100 feet high, and 7 feet in diameter and 30 feet high; a heater 6 feet in diameter and 24 feet high and a number of smaller tanks from 3 to 5 feet in diameter for the Liquid Carbonic Co., Pittsburg. The company has been operating its plant full time throughout the business depression, and has enough work in sight to insure this scale of activity until the end of April.

THE IRON TRADE REVIEW

Devoted to Iron and Steel Manufacture and to the Machinery, Metal-Working and Foundry Trades

PUBLISHED EVERY THURSDAY BY

THE PENTON PUBLISHING CO.

CLEVELAND.

BOSTON.....1053 Exchange Bldg.
BUFFALO.....932 Ellicott Sq.
CHICAGO.....1352 Monadnock Blk.
CINCINNATI.....First National Bank Bldg.
NEW YORK.....1005 West Street Bldg.
PITTSBURG.....510 Park Bldg.
DULUTH.....411 Providence Bldg.

Subscription, United States and Mexico, $3.00 per annum. To Canada and Foreign Countries, $4.50. Advertising Rates Furnished on Application.

Change of advertising copy must reach this office ten days preceding date of publication.

The Cleveland News Co. will supply THE IRON TRADE REVIEW through the regular channels of the American News Co.

European Agents: The International News Company, Breams Building, Chancery Lane, London, E. C., England.

ENTERED AT THE POST OFFICE AT CLEVELAND AS SECOND CLASS MATTER.

PRINTED IN AN OPEN SHOP.

March 19, 1908.

WHO SUFFERS?

One of the leading railroad publications complains, to the extent of more than a column of editorial, that the railroads are denied the privilege of recuperating from the panic under natural law, as they were allowed to do after previous panics, while other industries are allowed so to recuperate; that the railroads are "in effect singled out from other great vested interests to be the victims not only of economic, but of artificial and man-made law." The editorial specifically mentions the labor unions as being under public protection; and while it does not mention the steel industry by name it unquestionably points to it and bitterly complains of the policy of "declaring that prices must be maintained however low the volume of business falls."

The criticism reads smoothly when regarded purely on the grounds of theoretical principles, but the practical conditions which exist today answer all its arguments. There is complaint that the railroads are not permitted a free hand in reducing wages. The steel industry of which complaint is made has not reduced wages either. Complaint is made that steel prices are not reduced; freight rates are not reduced either. Each party is getting the same sauce in these two respects; where is the discrimination?

In behalf of the railroads the privilege to recuperate is asked. Surely the privilege is not denied. Their volume of business has fallen off and they have discharged men wholesale. There is no public complaint of their action. They charge the same rates as formerly for the remaining freight they haul; why should not they pay the same rates of wages to the men remaining in their employ?

The railroads are endeavoring to recuperate by curtailing their purchases, as of steel for instance. Who suffers there: the interest which saves its money, and recuperates, by not buying, or the interest which fails to get the orders? The steel industry well knows the railroads cannot afford to continue their former purchases, and that if prices were reduced they would probably spend less rather than more money.

The steel industry has suffered a great deal more than the railroads from decrease in tonnage; all statistics show that, yet it is not complaining. The tonnage of railroad orders for steel has declined much more than the tonnage of orders from other interests, but the steel industry does not complain to the railroads.

Obviously a plea is being made for lower prices upon steel products, but if prices were reduced, there is no likelihood that the railroads would fall in line and reduce freight rates upon those products. That is not their spirit at present, and it has not been in the past. It can be observed, over many years past, that a large proportion of all the advances in freight rates have come right at the tail end of a period of great activity in the iron and steel industry. So well recognized is the rule that last year when freight rates on pig iron and finished steel were advanced it was jocosely remarked that evidence was being furnished of a slump impending in the iron and steel trade. Not content with the last advance, railroad officials now talk of asking permission of the Interstate Commerce Commission to again increase rates.

The key to the complaint is not furnished but it can be sought. There is some reason to believe that the maintenance of steel prices is complained of, not because lower prices would induce more railroad buying, but because it is thought that lower prices paid by other industries, would stimulate freight traffic, at the same old rates or even higher charges, for the service which the railroad would contribute. Possibly that would be the result, but instead of its being a case of allowing the railroads to recuperate under natural law it would be making a direct contribution for their benefit.

SERVING ONE MASTER.

In passing sentence upon John R. Walsh at Chicago a few days ago, Judge Anderson of the United States District Court, in his decision expressed the opinion that "the key of the whole situation is, that no man can serve two masters." The defendant was president of a national bank, and the proof indicated that he loaned to himself practically three-fourths of the entire assets of his bank. Three institutions which Walsh controlled had deposits of about $18,000,000, which immense amount of money was invested, not in properties which had been developed, but in railroad and other properties, which he hoped to develop. "The banker," said Judge Anderson, "was lost in the promotor, the speculator, the railroad man. He owed his duty to the bank, his master. He attempted to serve these other interests and other masters. To my mind there has been in recent times no clearer demonstration of the statement that a man who is a banker ought to be nothing but a banker. Until those bankers who own and manage national banks understand that when they serve their bank they cannot serve any other interest, cases like this will probably continue to arise."

The sound doctrine announced by Judge Anderson should, in our opinion be applied to many other forms of busi-

ness, and in fact, to all forms of business, as well as to that of the banker. There is urgent need in the business world of greater loyalty, loyalty of employer to employe, and of employe to employer, of directors to stockholders and of managers to the business which they are paid to manage. The consuming desire to become rich and the constant increase of demands to meet living expenses and indulge in all sorts of extravagance, has resulted, in many cases, in men not being content with devoting their time and energy to one business. Often a man has connected himself with another business venture with the best of intentions, but has later yielded to temptation, depriving his primary interest of time and energy which belonged to it, and even sacrificing his employer's rights in order to fill his own pockets. We have in mind especially a recent case, in which it was charged that a prominent manufacturer was instrumental in selling the product of one plant in which he was interested, at a ruinous price, to another concern in which he was a heavy stockholder. The company which sold at the low price passed into the hands of a receiver. The one unscrupulous stockholder could afford to stand his share of the loss, because of his profit in the other concern, but all of the other stockholders were grossly wronged. The man who would commit such an act is just as guilty morally as was John R. Walsh. It is earnestly to be hoped that the successful prosecution of men of the Walsh type will have salutary effect upon the countless others who are pretending to serve many masters and are faithful to none.

THE PAYMENT OF WAGES.

We print, under the above title, on another page of this issue, an article by Forrest E. Cardullo, which is well worth the attention of every manager who has to do with the employment of labor. The amount paid out for labor is the largest item on the balance sheet of practically every manufacturing concern. Any method of reducing this charge is welcomed.

Mr. Cardullo discusses the advantages and disadvantages attending the operation of the various plans now in vogue—the day work, piecework, and premium systems. He makes the point that the great dissatisfaction existing among workmen over the piecework system is due to the fact that the rate is cut as soon as the workman attains such proficiency as will enable him to make a large increase in wages, over his fellow workman who is doing corresponding work under the day-wage system. And the fact that the rate is cut tends to cause the piecework system to defeat its own object. The workman soon learns the maximum wage that will be allowed him, and works so as to just make a little less than that wage. It may be that he is only then working at an efficiency of 50 per cent, but that makes no difference. He is not going to have his rate of pay cut. Thus the system fails of its purpose—the development of the maximum efficiency of the worker.

Mr. Cardullo has devised a plan whereby the necessity of cuts is done away with. The maximum amount that a man can increase his wage is determined in advance, and this is incorporated in a formula, which then automatically does the cutting as the production increases. The formula is so devised that the man can never make more than double his original wage. Therefore, any error in rate setting will not operate to give the workman exorbitant pay, and the workman knowing that his rate will not be cut, will be satisfied and work at the speed most beneficial to himself and his employer.

Many Stove Contracts.—G. W. McClure, Son & Co., Bessemer building, Pittsburg, recently received a contract from the Tennessee Coal, Iron & Railroad Co. for seven McClure three-pass hot blast stoves, 21 feet in diameter by 100 feet high, to be erected at Ensley, Ala. With the installation of the new equipment the McClure company will have built 20 stoves of its make at this plant. Other orders recently taken by the company, include the remodeling and relining of the Belmont furnace of the Wheeling Steel & Iron Co., at Wheeling, W. Va., and also the relining of the Martins Ferry furnace at Martins Ferry, O., for the same company. There have just been completed a McClure stove 19 x 85 feet for the Genessee Furnace Co., Charlotte, N. Y.; a stove 22 x 100 feet for the American Steel & Wire Co., at the Edith furnace, Pittsburg, where the iron work for a second stove has about been erected; and another stove 21 x 85 feet for the United Iron & Steel Co., Leetonia, O. The McClure company has also just completed the iron work for a stove 21 x 70 feet at the United Iron & Steel Co.'s plant at West Middlesex, Pa.

CLEVELAND CIVIL ENGINEERS HOLD ANNUAL MEETING.

The 28th annual banquet of the Civil Engineers' Club of Cleveland was held March 10 at the Cleveland Athletic Club and proved one of the best attended in the history of the club. The retiring president, Charles H. Wright, presided as toastmaster. After remarks by the incoming president, Willard Beahan, President Charles S. Howe, of Case School of Applied Science, spoke on "The Engineer's Relation to Industrial Education." He regretted the disappearance of the old time trade apprenticeship system as reflected in the present day mechanic. "Civic Art" was touched upon by W. H. Hunt, out of the wealth of his observation at home and abroad. City Solicitor Newton D. Baker spoke on "Engineering and the Law." President Wright in his address concluding the evening's entertainment pointed out with the aid of stereopticon views the more striking engineering accomplishments of the year in America and in Europe. The election of officers resulted as follows:

President, William Beahan; vice president, Robert Hoffman; secretary, Joseph C. Beardsley; treasurer, John H. Fox; librarian, George H. Tinker; directors, Hiram E. Baldwin and William O. Henderer.

Lackawanna Steel Election.—The annual meeting of the stockholders of the Lackawanna Steel Co. was held March 11, at the offices of the company, West Seneca, N. Y. E. A. S. Clark, E. G. R. Fearing, Edmund Hayes, Samuel Mather, D. O. Mills, Moses Taylor Pyne and Robert B. VanCortland, seven members of the board of directors whose terms expired, were re-elected for three years. Out of 349,714 shares, 263,894 were voted. The annual report showed the progress that had been made by the company during the past year under President Clark's administration. Among those present were President Clark, Vice President Moses Taylor Pyne and Secretary F. F. Graham, of New York.

HIGHER PROFITS

After Revival Predicted by Vice President McQueen, of Sloss-Sheffield.

At the annual meeting of the Sloss-Sheffield Steel & Iron Co. held March 11, a preliminary statement of earnings showing total profits of $1,779,673 for the fiscal year ending Nov. 30, 1907, was submitted. Because of the absence in Europe of President J. C. Maben, no pamphlet report was submitted to the meeting and the preliminary statement took no account of dividends or interest on bonds. The following comparison is made, however, taking the figures of the submitted statement and the basis of last year's figures:

	1907.	1906.	Increase.
Total profits	$1,779,673	$1,314,800	$464,873
Deductions	107,387	103,957	3,430
Net	$1,672,286	$1,210,843	$461,443
Bond interest	210,000	210,000	.....
Balance	$1,462,286	$1,000,843	$461,443
Pref. div.	469,000	469,000	.....
Balance	$993,286	$531,843	$461,443
Com. div.	500,000	500,000	.....
Surplus	$ 493,286	$ 31,843	$461,443

An encouraging report on the condition of the southern iron and steel market was made to the share holders by Vice President J. W. McQueen, also general manager of the company, who said in part:

"Conditions in the iron trade throughout the south are slowly but surely improving, but we don't look for any marked resumption of activity until after the presidential nomination. During February Sloss-Sheffield sold more iron than in any of the four preceding months—a reassuring sign.

"Our stocks were greatly reduced last month, and will be further reduced before the end of the current month. We now have about 40,000 tons of pig iron on the ground, which is not much compared with the 105,000 tons we had piled up not long ago.

"Four of our seven furnaces are in blast, and are producing at the rate of about 25,000 tons of pig iron a month. We expect that it will not be necessary to cut our production to a lower figure than this. February sales amounted to over 35,000 tons. The plant is in excellent physical shape.

"When buisness starts up again profits should be relatively higher than they were before the panic, for a noticeable decrease in the cost of labor and material has taken place."

Littlefield at Philadelphia.— Congressman C. E. Littlefield, of Maine, delivered the principal address at the fourth annual dinner of the Metal Manufacturers' Association in the Bellevue-Stratford, Philadelphia, Feb. 12. He spoke on "The Character of Class Legislation That is Now Demanded." President William S. Hallowell, of the association, presided as toastmaster. Other speakers were: George B. Hugo, Boston, "The Root Cause of Industrial Disturbances;" Rev. Charles L. Seasholes, Germantown, "Is Life Worth Living?" James A. Emery, New York, "Recent Supreme Court Decisions."

GREAT NORTHERN ORE.

The first fiscal year ended Dec. 7, 1907, of the Great Northern ore land shows total receipts of $1,650,000; balance undistributed income, $82,250; under the lease, 3,307,244 tons of ore were mined and shipped during the year. The first fiscal year of the trust covering the properties ended Dec. 7. The trust in whose benefits all certificate holders participate, holds stocks in certain companies. These companies control by ownership and leasehold, valuable iron lands in the Mesabi district in Minnesota aggregating 65,091 acres, of which there have been leased prior to Dec. 7, 1905, 1,596 5/10 acres. There has been received by trustees to be held and applied upon terms of trust agreement, $1,650,000; expenses of administering trust, $67,750; distributed to certificate holders September, 1907, $1,500,000, leaving a balance undistributed income of $82,250 on Feb. 1, 1908.

New Association Formed.—At a meeting of 40 sheet iron and galvanized pipe manufacturers at Cincinnati this week the National Conductor Pipe Association was organized. Those in attendance included probably half the manufacturers of the country and represented the majority of the manufacturing states east of the Mississippi, most of them being former members of the National Eave, Trough and Pipe Association which has not been active for several years. One officer, a commissioner, was selected, H. H. Bishop, Cleveland. While it is declared that a basic price list will be established, yet it is also declared that the association will not operate in restrain of trade nor will it come into conflict with federal or state anti-trust laws.

At the recent meeting of the holders of preferred stock of the Alabama Consolidated Coal & Iron Co., the following committee was appointed to look into the proposed plan of exchanging 5 per cent third mortgage bonds for preferred stock: J. William Middendorf, A. E. Waters and A. N. Rich. They will make a report at the meeting to be held shortly.

FURTHER IMPROVEMENT

Is Noted Among New England Industries of Varied Lines.

Worcester, Mass., March 16.—Land along the water front at Tenant's Harbor, Me., has been leased by Portland parties for a term of five years. It is expected that the frame for one or more schooners will be shipped there in the spring and the work of building started, thus reviving the ship building industry there. Thirty years ago, ship building was one of the important industries of this section, but languished until recently.

Further improvement among Connecticut industries is noted. The Meriden Fire Arms Co. is now running 59 hours a week and reports a steady improvement. The Parker Gun Co., also of Meriden, is on a 40-hour schedule, which is better than a few weeks ago.

At New Haven, the return of better times is indicated by the J. B. Sargent Co., makers of fine hardware, running on a nine-hour schedule; and several more departments of the Winchester Repeating Arms Co., are on full time again. The Blakeslee Forging Co., Southington, has asked its men to work three hours over time half the days in the week, in order to reduce the orders that have been piling up.

At the recent annual meeting of the American Hardware Co., New Britain, Conn., Carlisle H. Baldwin, president of the Corbin Cabinet Lock Co., an underlying corporation, was added to the board of directors. When the board of directors organized, it created the office of assistant secretary and named Charles B. Parsons as the first incumbent.

Voting Injunction Denied.—New Jersey courts have refused an injunction sought by the Canadian Improvement Co. to restrain J. Tatnall Lea and other Philadelphia parties and Kuhn, Loeb & Co., of New York, from voting on pledged stock of the Lake Superior Corporation. Fifty thousand shares of stock in this corporation are held by this syndicate as security for a $2,000,000 loan to the Canadian Improvement Co. The annual meeting of the corporation was to have been held Oct. 2 last, but was twice postponed, owing to legal complications which are now cleared away by the New Jersey decision which holds that the Canadian Improvement Co. can only regain voting privileges on the disputed stock by refusing to accept the extension of loans made last June.

LARGEST CONTRACT.

(Continued from page 519.)

to a point off the new waterworks tunnel at the foot of Porter avenue. The other section, which involves removing the wall between the Erie canal and the harbor for a long distance, has not been let. The federal government's lock will be at the end of this section.

To meet the drop of six feet in the river bed between its head and Squaw island, the government will build the new lock, which will be just below the old small one built by the state. The new one will take the largest ore carriers on the great lakes and lock them down six feet and out into the river proper, so that they can proceed on to Tonawanda. Only vessels of limited size and displacement can go down the river to Tonawanda now.

Was Elected President.—At the meeting of the board of the J. W. Paxson Co., Philadelphia, a few days ago H. M. Bougher was elected as president and general manager, to take the place of the late J. K. Bougher. The other officers chosen were: Vice president and marine superintendent, L. B. Shaw; treasurer, Howard Evans; secretary and purchasing agent, S. C. Bougher; assistant to general manager, J. S. Hibbs; consulting engineer, A. G. Warren.

It is officially denied that the United States plant of the American Sheet & Tin Plate Co. wil be removed from McKeesport, Pa.

The March dividend and interest disbursements, it is estimated, will exceed $70,000,000.

MANY IMPROVEMENTS

Noted in Annual Report of the Cambria Steel Co.

The annual report of directors of the Cambria Steel Co. for the year ending Dec. 31, 1907, has just been issued to the stockholders in pamphlet form. The profit and loss sheet carries these items:

Net earnings from operations		$3,888,199.39
Rents, income and interest		1,094,754.91
		$4,982,954.30
Fixed charges under Cambria Iron Co. lease, etc		420,687.58
Net income twelve months		$4,562,266.72
Total to credit income account, Dec. 31, 1907		$4,562,266.72
Which has been appropriated as follows:—		
Dividend paid Aug. 15, 1907	$ 575,000.00	
Dividend paid Feb. 15, 1908	675,000.00	
	$1,350,000.00	
To betterment and improvement account	2,400,000.00	
To general depreciation fund	500,000.00	
To inventory depreciation fund	300,000.00	
		$4,550,000.00
Balance carried to credit of profit and loss account		$ 12,266.72
Profit and loss account had a credit Dec. 31, 1906		$2,357,227.41
Increased by balance of income account transferred		12,266.72
		$2,369,494.13
And reduced by bad or doubtful accounts in 1907	$49,361.03	
Less collection of accounts charged off in previous years	36,085.33	
		$ 13,275.70
Balance to credit of profit and loss account, Dec. 31, 1907		$2,356,218.43

President Powell Stackhouse points out that the company mined 1,043,764 tons of ore in mines in which it is interested financially, for its own use, and sold 198,048 tons additional. He refers in detail to many items of general plant improvement and betterment made during the year and says:

There was expended for improvements, $2,102,522.05; of this amount $1,986,017.37 was charged to plant additions, and the remainder, $116,504.68, was repaid by amount realized from sales in 1907 of real estate and minerals, under terms of your lease from Cambria Iron Co. There was expended, in addition, $385,145.88 for replacements and alterations, and charged to operating accounts. Such further additions as may be required to your plant will be made when conditions justify and your earnings will permit.

Shipments of steel show a decrease of 4.43 per cent in quantity, and 0.87 per cent in the gross value of all products shipped compared with the preceding year, which was your maximum year. Your mills and shops were under great pressure to fill orders for their products up to the commencement of the financial panic in October, which promptly caused a substantial paralysis in all your operations, and while your order books contained orders for several months' work ahead, in nearly all lines cancellations and suspensions practically rendered your plant idle and from which it is slowly recovering.

In March, 1907, John W. Townsend, vice president, tendered his resignation, which was accepted at the stated meeting of the board, on April 17. This change required a reorganization of your officers and Charles S. Price, in addition to his present office of general manager, was elected vice president, vice John W. Townsend; Alexander P. Robinson, second vice president; Edward T. Stuart, treasurer, vice Alexander P. Robinson; Louis K. Kruse, assistant treasurer, vice Edward T. Stuart; and Fred Krebs from superintendent of Gautier department was appointed general manager of sales and connected with this office.

ABSTRACT OF PROPOSALS.

For Construction of Lock Walls in Black Rock Harbor, N. Y., opened March 14, 1908, at Buffalo, N. Y., by Lieut. Col. W. L. Fisk, Corps of Engineers.

	—LOCK WALLS— (Alternative bid.)															
Name and address—	Steel sheet piling, per ton 6,910	Steel waling and braces, per pound 192,000	Granite for quoins, per cu. yd. 328	Steel for quoins, per pound 116,740	Steel culvert, 72-inch, per lin. ft. 1,500	Steel culvert inlets, 30-inch per lin. ft. 100	Steel culvert branches, 18-inch, per lin. ft. 200	Steel pump well pipes, 30 inch, per lin. ft. 97	Steel drain pipe, 18-inch, per lin. ft. 56	I-beams and channels per pound. 45,700	Wrought iron or steel cable pipes, per pound 13,500	Cast steel bases, each 10	Steel eye bars, each 40	Anchorage bolts, per pound 9,600	GRAND TOTAL OF PROPOSAL. Steel.	Granite.
Great Lakes Dredge & Dock Co., Chicago	$56.00	$0.06	$60.00	$0.09	$18.00	$10.00	$5.50	$10.00	$5.50	$0.05	$0.08	$85.00	$35.00	$0.06	$967,865.60	$977,039.00
Buffalo Dredging Co., Buffalo	55.00	0.07	80.00	0.07	20.00	12.50	7.00	12.50	7.00	0.07	0.12	125.00	30.00	0.08	947,253.30	965,321.50
The Foundation Co., New York City	52.40	0.08	67.00	0.12	15.51	6.67	6.62	6.67	6.27	0.03½	0.09	93.00	43.75	0.07½	985,554.91	993,522.11
T. A. Gillespie Co., New York City	62.00	0.03½	75.00	0.07	15.00	8.00	8.00	8.00	8.00	0.05	0.10	200.00	75.00	0.10	1,045,880.80	1,062,309.00
Reed-Coddington Co., Niagara Falls	70.00	0.10	50.00	0.10	15.00	7.00	5.00	7.00	5.00	0.05	0.05	102.40	58.40	0.08	1,233,887.00	1,238,613.00
McArthur Bros. Co., New York City	53.00	0.05	60.00	0.16	15.65	8.65	6.65	8.65	6.65	0.05	0.10	100.00	65.70	0.05	822,302.85	823,304.45

PERSONAL.

Benjamin Ogden has been engaged by the Peck-Williamson Foundry Co. to take charge of its plant at Wellston in the capacity of general manager.

R. A. McDougall, who has been in the offices of the Republic Iron & Steel Co., at Buffalo, has taken up his new duties in the company's offices in the Citizens building, Cleveland.

Daniel R. Day has been chosen general manager of the Union Malleable Iron Works, Moline, Ill, to fill the place made vacant by the death of Frank W. Gould.

Joseph G. Walton, formerly in charge of the Pittsburg office of the Robert Field Co., has accepted a position with Walter-Wallingford & Co., and will travel from the main office at Cincinnati.

Frank Carnahan, treasurer of the Railway Steel Spring Co., has been given a year's leave of absence by the company because of ill health. The assistant treasurer will fill his office during his absence.

Clem. L. McGowan, formerly of Ironton, has been made superintendent of the Atlanta Steel Co. plant at Atlanta, Ga., to succeed J. C. Maloney, formerly superintendent of the Belfont Iron Works Co. here.

Frederick J. Mayer, of Baltimore, the well-known coke expert who, with David B. Carse, of New York, controls the Von Bauer system patents in the United States, has returned from an extensive foreign trip.

Charles M. Schwab was guest of honor and principal speaker at the first annual banquet of the Bethlehem Industrial Commission March 12. Among the other speakers was H. S. Snyder, of the Bethlehem Steel Co.

Emil Axner has been appointed manager of the Chicago office of Matthew Addy & Co., succeeding Charles L. Miner, who has gone with Pickands-Brown & Co., at Chicago. C. C. Boyden, formerly with the Boston office of Matthew Addy & Co., is now also associated with the Chicago office.

The Ironton Engine Co. at its annual meeting reported that its business had doubled within the past year. The directors elected are: Col. H. A. Marting, Thos. L. Collett, D. C. Davies, L. H. Mittendorf, J. R. Alfree, F. L. McCauley, F. C. Tomlinson, A. R. Johnson and F. R. Hetzel. The directors will organize within a few days.

W. J. Moore has been appointed superintendent of the blast furnaces at Joliet, Ill., of the Illinois Steel Co., succeeding Matthew McClung, deceased. Until two years ago Mr. Moore was the general chemist at the Joliet plant, was sent to the North Works, Chicago, and later promoted to the South Chicago mill.

OBITUARY.

Justus A. Traut, a prominent manufacturer of New Britain, Conn., died there recently of heart disease. Mr. Traut was one of the leading inventors of the country, having secured over 700 patents.

Joseph H. Livesey, for years superintendent of the Crane Elevator Co., Chicago, died March 15 of pneumonia at Asheville, N. C. He was born in Lancashire, England, 67 years ago and came to Chicago in 1855, entering the employ of the Crane company when a lad.

James Scully, one of the founders and the general foreman of the Rowe-Stephens Mfg. Co., Detroit, Mich., died of heart failure at his home, March 10. He was born in Belfast, Ireland, 63 years ago and came to Detroit in 1862. Two sons and two daughters survive.

Bernard H. Kramer, until five years ago active in the management of the Kramer foundry at Dayton, O., died March 11, aged 77 years. He was the father of Henry, George and Joseph Kramer, of the Kramer Bros. Foundry Co., and had been active in industrial circles at Dayton for more than half a century.

George C. Converse, general superintendent of the plants of the New Jersey Zinc Co., with headquarters at Bethelhem, Pa., died March 10 on board a vessel en route from Alexandria to Naples. Ill health had led to a trip abroad, on which he started a month ago with his family. Mr Converse was 53 years of age and a graduate of Lehigh University. He was one of the best known authorities in zinc manufacture in the country.

Henry John Kistler, who has been identified with many of the older steel mills in the Pittsburg district, died at his home in North Braddock, Pa., March 11, age 78 years. Mr. Kistler was born in Westmoreland county, Pa., and after fitting himself for a mechanical engineer, became connected with iron and steel making in the western part of the state. He assisted in erecting many of the older iron plants of Pittsburg, Monongahela valley and about Irwin and Jeannette. At various times he was connected with the old Schoenberger steel plant, Jones & Laughlin Steel Co. and the upper and lower Union mills of the Carnegie Steel Co.

Reuben Williamson, one of the oldest residents of Sharon, Pa., died March 14, aged 82 years. Mr. Williamson was born in England, and came to America in 1853. In 1864 he went to Sharon, becoming connected with the Sharon Iron Works and later was interested in the Greenville mills. He was also associated with the Emmett Mining Co., Hamilton Ore Co., and other enterprises in the Shenango valley. In his life Mr. Williamson was quite active in secret society circles.

REPUBLIC WITHDRAWS

From Agreement with Amalgamated—Western Association Follows.

(Special Telegram.)

Pittsburg, March 18.—The Republic Iron & Steel Co., acting independently, has withdrawn from the continuous working agreement entered into in 1904 with the Amalgamated Association of Iron, Steel and Tin Workers. This agreement provided that the mills remain in operation after the expiration of the wage agreement, June 30 of each year until a new arrangement had been made. When the association and manufacturers failed to reach an agreement, the settlement was left to a board of conciliation. It is understood that the Western Bar Iron Association has also abrogated the agreement with the Amalgamated Association and is now negotiating for a substitute arrangement. A conference has already been held with the Amalgamated officials to discuss a proposed agreement. It is stated that the operation of the continuous working agreement has not been entirely satisfactory to the manufacturers and this has led to its annulment.

The bi-monthly adjustment of wages for sheet and tin workers under the provision of the sliding scale of the Amalgamated Association of Iron, Steel and Tin Workers provides that the men will be paid on the base rate in the sheet mills and 2 per cent above the base rate in the tin mills during the next 60 days. The previous bi-monthly examination determined the sliding scale rate at 2 per cent above the base on sheets and 6 per cent above that on tin, due to the reduction in the prices of sheet and tin plate, which fell within the past two months. This adjustment in effect means that the sheet manufacturers will receive 2.6 per cent less wages and the tin workers 4 per cent less during the next two months.

THE PAYMENT OF WAGES

By Forrest E. Cardullo.[1]

One of the greatest problems with which the managers of great industrial enterprises are confronted is that of the best system of paying wages. There are in general use three systems of paying wages. The first is the system of time payment, wherein the employe is paid so much per hour for his time. The second is a system of piecework, wherein the employe is paid so much for each piece of work done. The third is a combination system in which the employe is paid for his time, but the rate of wages is dependent upon the amount of work which he does. Of these three systems the first mentioned is the oldest, and in most cases the rate of payment is made so much per hour, and some time-keeping system is used, the purpose of which is to determine the number of hours each employe works. The second system known as the piecework plan, was introduced with the purpose of correcting the defects and deficiencies of the first plan. It happens however that the piecework plan as it is generally used is much less satisfactory than the day work plan which it is intended to supersede, and it has therefore in many cases proved a flat failure for reasons that will appear later. In order to combine the advantages and minimize the defects of the two preceding systems, the third or combination system has been developed in many forms. The one best known perhaps is the Halsey premium plan, although many other methods of combining the two might be mentioned.

Defects of the Day Work and Piece Work Plans.

The object of every system of wage payment must be twofold; first, to reward the workman for the time and effort spent at his work, and second, to encourage him to produce his work at the lowest cost. The defects of the day work plan of wage payment are, first, that it rewards the man only for the time spent, and not at all for the effort put forth; and that it does not encourage him to do his work for the least cost.

The defects of the piece work plan are that it rewards a man only for the effort put forth and not at all for the time spent at his work, and that if the wages earned are high in comparison with the regular day rate of wages, the employer is tempted to cut the rate. The result of this is that the workmen soon find out just what maximum rate the employer is willing to pay, and work just hard enough to earn almost that maximum rate and no more, thus avoiding a cut.

The Ideal System.

The ideal wage system is one wherein the man is paid for his time, is paid for his effort, in which there is no temptation to the employer to cut the rate, in which there is every incentive to the employe to increase his output, and which is at the same time so easily understood that there shall be no chance of quarrel over the amount of the employe's earnings.

The writer has been acquainted with many shops in which all these systems of wage-payment have been in use. Before deciding upon the particular system which will be most nearly ideal it will be well to consider the faults and virtues of the different systems as they appear in actual practice. In regard to the daily wage system the writer has found that the men working under such a system are invariably satisfied with system and invariably dissatisfied with the wages. It is very seldom that a shop which pays straight day wages in all departments can afford to pay very high wages, for the reason that the system does not encourage fast work and a large daily output per man. If the men do each day one-half, or two-thirds of the amount of work which they could do, and would do under a piecework or premium system, it is evident that the wages which they will receive for their work will necessarily be less than the wages paid in a shop working on the piecework or premium plan. If larger wages are paid, it will be at the expense of the manufacturer's profits, and the employer will be compelled to close up his business unless the profits of his competitors who use the piecework or premium plans are exorbitant. This rule is of course, like most other rules, subject to exceptions, but it is a rule which the writer has observed to be true in the great majority of cases.

A Typical Case.

Let us suppose for a moment that the matter of day wages so adjusts itself that the workman who receives day wages receives exactly the same amount per week on the average that he would receive in some other shop had he been paid by the piece for the work he does. Then the labor cost for each piece will be the same in both shops, notwithstanding that the men in one shop are paid day wages, while the men in the other shop are paid by the piece. It must not be inferred, however, that the cost of producing a piece is the same in both shops simply because the labor cost per piece is the same in both shops. In order to make this matter plainer, let us take a numerical example. We will suppose that in the works of the Mossback Machine Co., A receives $2 per day for planing engine frames. He turns out one frame a day. In the works of the Cyclone Manufacturing Co., B turns out three similar frames in two days, receiving for each frame as a piece rate, $2. The labor cost per frame in each case is $2. In the Mossback Co.'s shop, however, the planer and tools, the building and so on, are used for 10 hours in order to turn out one frame, while in the Cyclone Co.'s shop they are only used for 6 hours and 40 minutes. If the use of tools and building for one day be worth $1, then the total cost of planing the frame in the Mossback Co.'s shop is $3, while in the Cyclone Co.'s shop it is only $2.67. Thus we see that the total cost of a piece or an operation increases with the time spent in producing that piece or performing that operation, so that a $4 man who turns out two pieces per day, does work much more cheaply than a $2 man who turns out only one piece per day.

Effect of Overhead Charges on Cost of Work.

This matter of the effect of the rent of tools, other equipment and buildings upon the cost of work is one that is only just beginning to receive its due share of attention. If a tool is worth $10,000 set up in the shop and ready to run, then that tool costs the owners of that shop about $1,000 per year, since if they had not installed the tool, they could get 5 or 6 per cent for their money, and they would not have to pay insurance and taxes. Then again a tool wears out in the course of 20 or 30 years, or if it does not wear out, it ceases to be adapted to the work which it must do, and in the interests of economy must be replaced by a better and more modern tool. Taking these items of expense all together they amount to some 10

[1]Professor of shop work in the L. C. Smith College of Applied Science, Syracuse University.

per cent per annum on the cost of the tool. In the case of a $10,000 tool, this amounts to a little more than $3 a day. Not only does this hold true for tools, but also for buildings, land, and all other equipment. Thus in case of a shop employing 100 men, and having a value exclusive of tools of $100,000, the rental is over 30 cents per day per man. It will readily be seen then, that any system of wage payment which will increase the daily output of each man will, in general, reduce the cost of production.

Increase of Output Under the Piece Work System.

To a person who has not studied the subject, one of the most surprising things is the enormously increased output per man which a piecework system will produce. It might be thought perhaps, that men working for daily wages were doing at least two-thirds as much work as they were capable of doing, but the results of the introduction of a piecework system often demonstrate that such men, so far from working at 2/3 of their best rate, are often not even working at 1/3, or sometimes at not even 1/5 or 1/10 of that rate. I do not mean to say that such men are "soldiering," or that they are lazy or incompetent. They have simply fallen into a rut. They have ceased to use their brains in doing their work, and are not particular to use those methods which will do the work in the least possible time. On the other hand, a man who is paid by the piece will continually study every operation which he has to perform. He will find out for instance, the proper place to lay down his tools, and the best way to pick them up again. Let us suppose that a part of his work consists of the nailing of a box. He will find out just how many nails he must use, just where he must lay them in order to pick them up most quickly, just where he must lay his hammer in order to have it most convenient, just how many blows he must strike on each nail, and so on. Such a detailed study of his work is not encouraged in the case of the man who is not paid by the piece. Consequently he does not attempt it and although he works steadily and diligently, he is not accomplishing results every minute of the time in the same way as is the workman who is paid for results and nothing else. Let us suppose that a shop employing men at the rate of $2 a day decides to change from day work to piece work. The employer estimates that his men will do a little better than half as much again on the piecework plan, and he decides to pay 2/3 as much per piece as his cost system shows that he has been paying in the past. He figures that by so doing, his employes will be able to make a slightly better wage than they have been receiving and that his labor cost will be cut to 2/3 of its former value. A few weeks' experience with the piecework plan, however, shows that he is very much in error. Many of his men will almost immediately double their wages. The men will change around from job to job until each is doing the work which he can do the best. Each makes a detailed study of his work and some will soon be found who will produce two and three times the work in a given time that others can do when employed on the same operation. Sometimes this unusual ability is due to great strength, or dexterity, or endurance on the part of the workman. Sometimes it may be due to what some people would regard as a defect, as lefthandedness, or deafness. After the piecework system has been in use for three months he will find that very few of his employes are making less than $3 a day, and some of them are making $8 or $10 a day. The employer immediately concludes to revise the piece rates, reducing those rates which result in wages exceeding $3.50 a day. His men soon find that $3.50 a day is his limit, and every one proceeds to do $3.40 worth of work and no more. While the manufacturer may be right in thinking that $3.50 a day is a fair wage for men engaged in the class of work his employes are doing, he has missed entirely the point of the piecework system if he attempts to limit the men's earnings by a reduction of rates. The great essential of a successful piecework system is that there shall be no limit to the earnings of the men, but rather that they shall be encouraged to earn all they can.

Piece Work in Standardized Lines of Manufacture.

Certain lines of manufacture in this country have arrived at the point where they are so thoroughly standardized that it is possible to say within a few cents what the average wage of a number of mechanics will be for a given piece rate. As an example of such an industry we may take the manufacture of watches. This is a class of work requiring a high degree of skill, but notwithstanding this fact the average time required for any particular operation is known with great exactness, since the methods in use have changed very little in many years. Consequently the employer is able to set a piece rate which in the average case will pay a fair wage. If the average wage so earned is somewhat in excess of the prevailing day rate for similar lines of work the mechanics will generally be very well satisfied so long as no cut is attempted. Those men who are lacking in the degree of skill necessary to earn good wages in any particular operation very soon of their own accord leave that line of work for another line in which they are able to earn better wages. The effect of this piecework system in such a case is then to put each man in the position in which he will earn the most wages for himself and be of the most value to his employer.

It will thus be seen that under favorable conditions, a piecework systems of advantage both to the employer and to the employe. It solves automatically many questions of shop management, of discipline, and of manufacturing method. It guarantees to the employer that the work shall be done at the least cost consistent with the standard of quality which he requires, and to the employe that his wages shall be better than the average daily rate, and that their amount shall depend solely upon his own industry and skill. No difficulties are experienced from such matters as "soldiering," or favorites of the boss, or idle machinery or equipment. The only chance for disagreement lies in the matter of the rate itself, and if that rate be so set that all mechanics who have been working for some time in any particular line shall make wages which are on the average from 10 to 30 per cent in excess of the prevailing day rate, there can be no question that the rate is fair.

The Premium System.

It is only in exceptional cases that work can be so standardized that a rate can be set which will be fair to both parties without considerable preliminary juggling and cutting. If there is any juggling, or cutting of the rate, the piecework system will for some time after such events, be anything but satisfactory. The advantages which we have just been pointing out will diminish almost to the vanishing point, while the disadvantages will loom large. In order to arrive at some basis of payment which would not pay such exorbitant wages as does the piecework system in the event of a wrong estimate of the time required for an operation, the premium system has been introduced. The premium system may be defined as a double rate piecework system, since by it a man is paid at a given rate for a

certain amount of work per day, and at a fraction of that rate for all work in excess of this. The way in which the rate is generally computed is somewhat misleading, and does not at once convey to the mind the fact that the premium plan is a piecework system. Let us suppose that the work consists of assembling guns. The workman is allowed 30 minutes to assemble each gun and receives 30 cents an hour. Should he succeed in assembling guns so rapidly that it required him but 20 minutes for each gun, he will be paid for some fraction, say 1/3, of the 10 minutes that he saves in addition to being paid for the 20 minutes that he works. Thus for 20 minutes work he will receive 23 1/3 minutes pay. In order to make the computation a little easier, he is allowed one day to assemble 20 guns. Following our figures out, he would succeed in assembling 30 guns in one day, or in doing 15 hours work in 10 hours, thus saving 5 hours. His days pay would then be 10 hours actually worked plus 1/3 of 5 hours saved, all at the rate of 30 cents an hour or $3.50.

A little thought must convince the reader that so far as the workman is concerned, this method of payment is exactly the same in its results as if he were paid 15 cents apiece for the first 20 guns assembled each day, and 5 cents apiece for all the guns subsequently assembled. In other words, the premium plan is a piecework plan with a provision for automatically cutting the piece rate in case the rate is greater than it should be. It has many of the advantages of the piecework system though not in so great a degree. It may and often does have all the disadvantages of the piecework system, although the automatic provision for rate cutting makes the disadvantages also less in degree. We may conclude therefore that in those cases where the work is not well standardized, the premium plan is preferable to the piecework plan, while in those cases where the time required by the average mechanic for a given operation is known with great accuracy, the straight piecework plan is the best form of wage payment to adopt.

Errors in Time Allowance.

Since the premium plan is almost always used in those cases wherein the time required for an operation is not known with accuracy, it will follow that considerable errors will often be made in setting the time allowance, as it is called, the time allowance being the time allowed for the given operation for which payment is desired to be made. Sometimes the amount of this error is very great, a time being set which is four or five times as great as the time which an expert machanic will eventually require for the operation after he becomes thoroughly familiar with it. In such a case the employe's wages will amount to two or three times the prevailing daily rate, unless the fraction of saved time paid for be made very small. If this fraction be made very small, it is evident that the mechanic will have but small incentive to increase his daily output, and the plan might just as well be dispensed with in favor of straight day wages. If a cut is made in the time allowance the result will be exactly the same as far as the resulting trouble is concerned as if a cut were made in a piece rate.

Requirements of the Best System.

From the foregoing discussion it will be apparent that the successful system of wage payment must pay for results obtained rather than for time spent. In other words, it must be some modification of the piecework or premium systems. It must, furthermore, contain an automatic provision for cutting the piece rate in the event that the rate has been fixed too high, or the time allowance made too great by the employer. To be perfectly successful, the system should provide a maximum daily wage rate which can never be exceeded, no matter how great the error the employer may have made in fixing the piece rate or time allowance. A system combining these several advantages would be practically ideal, in all cases where a piecework or premium system is at all applicable.

The Simplest System.

The simplest possible system combining these advantages, of which the writer has any knowledge, is one which pays the workman a minimum rate multiplied by one plus the time saved divided by the time allowed. Let us take as an example the case of the armorer which we have already considered. Assuming that his minimum rate is 20 cents per hour, or $2 per day, and that the maximum rate which the employer is willing to pay is $4 per day, we have for his hourly rate, 20 cents multiplied by one plus ten minutes saved divided by 30 minutes allowed for the assembling of each gun. The hourly rate will be then, 26 2/3 cents. If his minimum rate were 30 cents per hour, as it was in the case of the premium system we considered, his hourly rate would be 40 cents and the maximum rate which he could earn under the system proposed would of course be 60 cents an hour, or $6 a day.

This system may be modified to advantage by adding some fraction of the time saved divided by the time allowed instead of the entire quotient. The rate might then be expressed by the following formula:

$$\text{Rate} = R\ (1 + \frac{S}{NA})$$

where R is the minimum rate in cents per hour, A, the time allowed for the work, S, the time saved in doing the work (that is, the time allowance minus the time actually taken for doing the work) and N is any number greater than 1. Returning again to our armorer for an illustration of the use of this formula, let us so fix the value of N, that when his minimum rate is 30 cents per hour as before, his maximum rate will be $4 per day of 10 hours. Evidently the greater the time saved, the greater will be his hourly rate, but, no matter how fast he works, he never can save the whole of the time allowance. Consequently if we put the rate equal to 40 cents, R equal to 30 cents, S equal to A, and solve for N, we will get

$$40 = 30\ (1 + \frac{A}{NA})$$

or,

$$N = 3$$

The man's hourly rate will then be

$$\text{Rate} = 30\ (1 + \frac{10}{3 \times 30})$$

or, 33 1/3 cents.

The value of the number N in the formula proposed may be found very quickly by subtracting the minimum rate from the maximum rate, and dividing the minimum rate by the difference. In the above case, the minimum rate was 30 cents per hour, the maximum rate 40 cents per hour, and dividing the minimum rate by the difference, 10 cents, we have for the value of N the number 3.

If the employer succeeds in so fixing the time allowance that the time saved is a very small proportion of the time allowed, the plan proposed gives results which are pracically the same as the results given by the piecework system if the value of N be taken as 1. If the value of N be taken as some other number than 1, as for instance, 2 or 3, the results obtained are practically the same as would be obtained if the premium system were used, and the employe was paid for one-half or one-third of the time saved. If however, the employer has

made a grave mistake in fixing the time allowance, making it much too large, the employe will still be unable to make exorbitant earnings, since he can never make as much as twice the minimum rate if N be equal to 1, and if N be more than 1, say 2 or 3, he will make less than 1½ or 1-1/3 of his minimum rate.

Effect of Variation of Values.

In order to show the effect of the variation of the different quantities upon the wage rate, the following table has been prepared:

Table I.

Increase of Output.

Time taken in per cent of time allowance.	Per cent of time allowance saved.	N=1.	N=2.	N=3.	N=4.
95	5	1.05	1.025	1.017	1.012
90	10	1.10	1.05	1.033	1.025
80	20	1.20	1.10	1.067	1.050
70	30	1.30	1.15	1.10	1.075
60	40	1.40	1.20	1.133	1.10
50	50	1.50	1.25	1.167	1.125
30	70	1.70	1.35	1.233	1.174
10	90	1.90	1.45	1.30	1.224

A table giving the labor cost per piece is even more instructive, from the employer's standpoint.

Table II.

Labor Cost Per Piece.

Time taken in per cent of time allowance.	Per cent of time allowance saved.	N=1.	N=2.	N=3.	N=4.
95	5	.9975	.97375	.965	.960
90	10	.99	.945	.930	.921
80	20	.96	.88	.852	.840
70	30	.91	.804	.770	.752
60	40	.84	.720	.680	.660
50	50	.75	.625	.584	.563
30	70	.51	.405	.371	.352
10	90	.19	.145	.130	.1225

A study of these two tables will show that the greaten the amount of time which the workman saves the higher will be his wages; that the wages are in all cases limited to a reasonable amount even though the time allowance is radically wrong; that the labor cost per piece steadily decreases as the man's efficiency increases, and that in consequence of these facts, an increase in efficiency on the part of the workman either through his own industry and ability, or through changes in tools and methods introduced by others, will be profitable both to himself and to his employer. This system of computing wages has all the advantages which we are accustomed to associate with either the piecework or the premium plan. It secures the maximum output per man, in the same way that either of the above systems would do, were the men satisfied that no cut in wages would be attempted. The problems of discipline, of supervision, of lost time, and so on, will be very much simplified, and every man will soon find himself in the place where he will be able to earn the best wages for himself, and be of the greatest profit to his employer.

If the time allowance has been made very much too large, it will be apparent that the extra wage which a workman can make by very slightly increasing his output is small. Consequently if very bad judgment has been used in fixing the time allowance, the full efficiency of the system will not of course be realized, although even in that event the results obtained by its use in the matter of low cost per piece will be very much superior to those obtained in the case of the piecework or premium plans when a similar mistake has been made. Such a matter is not serious, however, since the time allowance, the minimum rate, and the value of N in the equation can be so readjusted that with the same maximum rate the men can be offered a greater inducement for increasing their output without diminishing in any respect their daily wages. Let us take an example in order to see how this may be done. A man's minimum rate is 20 cents per hour. His maximum rate is 40 cents per hour, and the value of N is of course 1. He is allowed 10 hours for finishing a certain lot of work, and after a while succeeds in doing his 10 hours' work in two hours. His hourly rate will then be 36 cents. There is then very little inducement for him to cut the time required by, say 10 per cent, since if he does so his hourly rate will be raised only from 36 to 36½ cents. In other words, a 10 per cent increase in his rate of production will only net him about 1½ per cent increase in his pay. If we are to secure this increase in rate of production we must so change matters that the man can make a better increase in his hourly rate. Let us take his minimum rate as 36 cents per hour, and set the value of N as 2 instead of 1 as it was before. The time allowance will be changed from 10 hours to 2 hours. If the man still does the work in 2 hours he will receive 36 cents per hour. If now he reduces his time 10 per cent he will receive 37.8 cents per hour. However, if he even goes so far as to cut the time in two, doing the work in 1 hour, he will not receive more than 45 cents per hour. Thus, by a suitable increase in the minimum rate, combined with a decrease in the time allowance, we can effect a reduction in the labor cost per piece, without reducing the man's daily earnings for a given output.

Recapitulation.

Recapitulating the advantages of this system, which the writer prefers to call the Diminishing Premium system, we find as follows: 1, this system will produce a given quantity of work at a minimum cost. 2, any increase in the rate of production results in a lower labor cost per piece. 3, a workman is unable to make exorbitant wages. 4, a workman will find his way automatically to that position in which he has the greatest usefulness to his employer. 5, since the wage rate depends on the output of the man, he keeps himself so busy that questions of discipline will not arise. 6, cuts in the rate of pay are never necessary under any circumstances if the system be intelligently applied and consequently labor troubles from this source are avoided. From the standpoint of the workman we have the following further advantages. 7, he is always sure of receiving at least his minimum rate, whether or not his work is spoiled. Under the piecework plan, if a man's work is spoiled, whether through his fault or that of another, he loses his entire day's pay. 8, the low total cost per piece enables his employer to pay him the best wages per day, and to give him steady employment. 9, he is offered the opportunity to earn large but not exorbitant wages by the exercise of skill and ingenuity in his work. 10, the knowledge that cuts are not necessary is a source of satisfaction to him as well as to his employer. All these advantages arise out of the two fundamental principles upon which this system is based, namely, the payment of a wage which becomes larger with every increase in the workman's daily output, and an automatic provision for limiting this wage to a reasonable figure.

Will See Pittsburg.—April 3 will be a red letter day for the Traffic Club of Pittsburg. On the evening of that date, the sixth annual dinner of the club will be held at the Hotel Schenley in that city, and the speakers on this occasion will be Robert Mather, president of the Rock Island Co., and Dr. Woodrow Wilson, president of Princeton University. During the day, a terminal trip under the auspices of the Pennsylvania railroad and the Westinghouse interests will be taken, the train leaving the Union depot, Pittsburg, at 10:30 a. m. Lunch will be served at the plant of the Westinghouse Air Brake Co. A large attendance of traffic and other railroad officials is expected to be present on the trip and at the banquet which will be held in the evening.

NEW ADDITION TO THE PLANT OF THE CLEVELAND PUNCH & SHEAR WORKS CO.

The Cleveland Punch & Shear Works Co., Cleveland, manufacturer of heavy punching and shearing machinery, has recently completed an addition to its plant on Hamilton avenue, Cleveland, to accommodate the punch and die department, and provide office facilities in keeping with the business which has been built up.

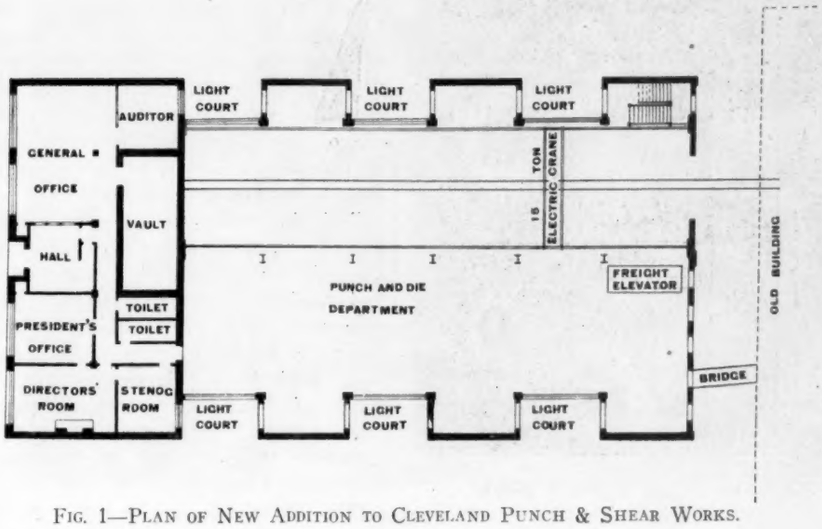


FIG. 1—PLAN OF NEW ADDITION TO CLEVELAND PUNCH & SHEAR WORKS.

The lot available for building was 80 x 156 feet upon which were erected an office building 40 x 80 feet, two stories and a basement and a two-story machine shop 80 x 116 feet. The two buildings are separated only by a fire wall, in which are two openings amply protected by fire doors. In planning both buildings considerable attention was given to convenience and comfort of employes as well as the efficient handling of both the manufacturing and commercial parts of the business. The heating, ventilation and toilet facilities were given careful attention and, although the lot was built in upon two sides, the lighting was admirably worked out.

Office Building.

In the office building fire resistance was one of the primary considerations and reinforced concrete was selected as best filling this condition. The footings and foundation walls are of concrete, while the entire framework, floors and roof are of concrete reinforced with round and square steel rods. The walls are of brick and are so arranged that a 4-inch brick veneer covers all concrete members, thus doing away with the checkered appearance which has at times been cited as an objection to the reinforced concrete building. As an additional protection against fire, a vault was constructed of ample size to contain all files and records and have them readily accessible. Upon the second floor, the vault is divided into two compartments, that adjoining the drafting room being fitted with pressed steel cabinets in which all drawings are filed in almost absolute safety from fire originating either within or without the building. All vaults are artificially lighted and form a pleasing contrast to the cramped and poorly lighted affairs which are commonly found.

The stairs, floors and finish are of wood, Georgia pine being used in all except the president's and directors' rooms, which are of quarter sawed oak paneled to a height of 7 feet. In the directors' room a carved mantel in Italian renaissance style occupies one side of the room and a large table designed to match the mantel produces an effect seldom attempted in a building of this character. Excellent light is obtained from large windows which extend almost to the ceiling on the front and a number of smaller windows opening into light courts in the rear.

Shop Building.

There is one door upon each floor opening into the shop. This building is of steel skeleton frame with concrete floors and brick walls. A single row of columns divides the building into bays, each 30 feet wide with three 10 x 20 feet light bays on each side. The arrangement of both buildings is shown in Fig. 1. The first floor is of concrete with the exception of a section at the rear door, which is laid in 4-inch paving block. This section is used to receive heavy trucks and is so arranged that machines may be loaded directly from a 15-ton electric crane built by the Cleveland Crane & Car Co., which occupies the west bay. In this bay also is a narrow gage track connecting with the older portion of the plant.

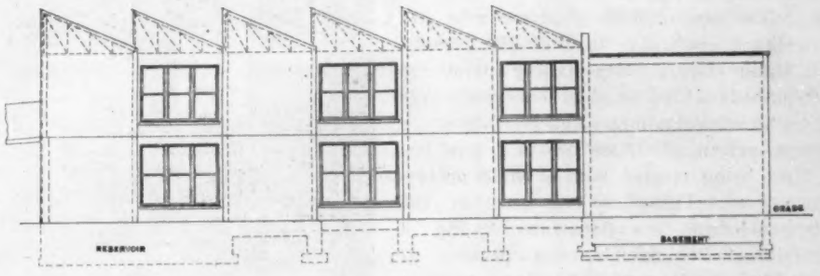


FIG. 2—ELEVATION OF NEW BUILDING.

The east bay is occupied by a tempering room and shipping room. In the tempering room are a series of concrete tempering vats connecting through floor conduits with two concrete cisterns occupying the entire light bay beneath the stairway (Figs. 1 and 2) and the adjoining light court. The tempering solution is pumped from one cistern to the tempering vats and when hot, is returned to the second

cistern where it remains until cool. The cisterns are covered with reinforced concrete slabs provided with manholes for inspection. A three-ton electric elevator installed by the Otis Elevator Co., is located in this bay. The platform of this elevator is made unusually long, so that material, much of which is in the shape of steel bars, may be raised to the second floor in a horizontal position. A view of the first floor of the shop is shown in Fig. 3.

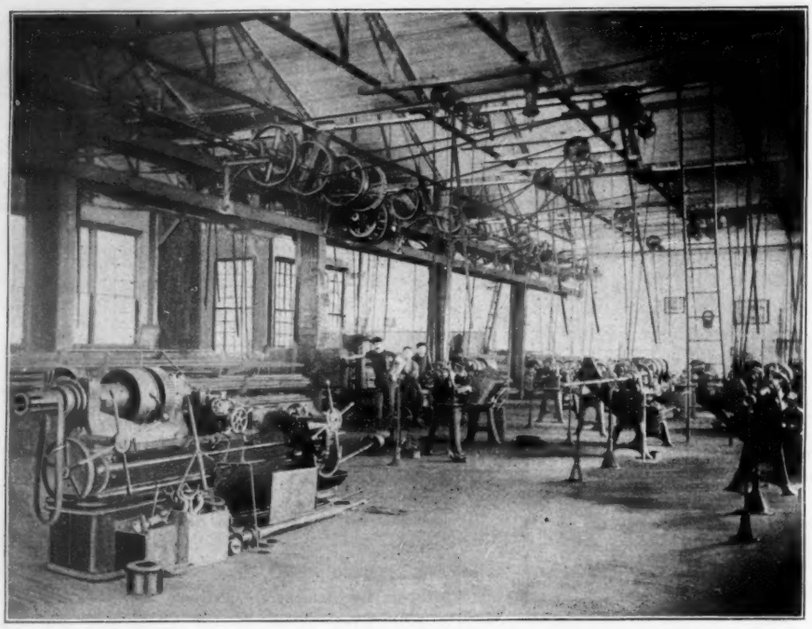


FIG. 3—PUNCH AND DIE DEPARTMENT, CLEVELAND PUNCH & SHEAR WORKS CO.

The second floor is of concrete, designed for a live load of 250 pounds. Upon this, wooden nailing strips are embedded in cinder concrete over which a 1⅝-inch sub-floor and a ⅞-inch maple floor are laid, the latter being treated with a wood preservative. This floor is used as the punch and die department. Fig. 4 shows the machines in process of erection. Power is obtained from two alternating current motors suspended from a lattice steel framework supported on the center columns. This framework also supports the main shaft and runs the entire length of the building. Countershafts are supported from the roof trusses.

The roof is supported on Pratt trusses extending across the building to which are connected saw-tooth trusses 7 feet x 6 inches centers. The roof is composed of 1¾-inch sheeting covered with composition roofing. The building was designed for an additional story and the columns have been drilled for connection to the future floor system.

Light for the first floor is provided by one large two-mullion window, and two smaller windows into each light court and a row of smaller windows in the rear. Each of the larger windows has over 200 square feet of glass. The lighting of the second floor is accomplished in the same manner, with the addition of six panels of saw tooth windows. The saw tooth windows face the north.

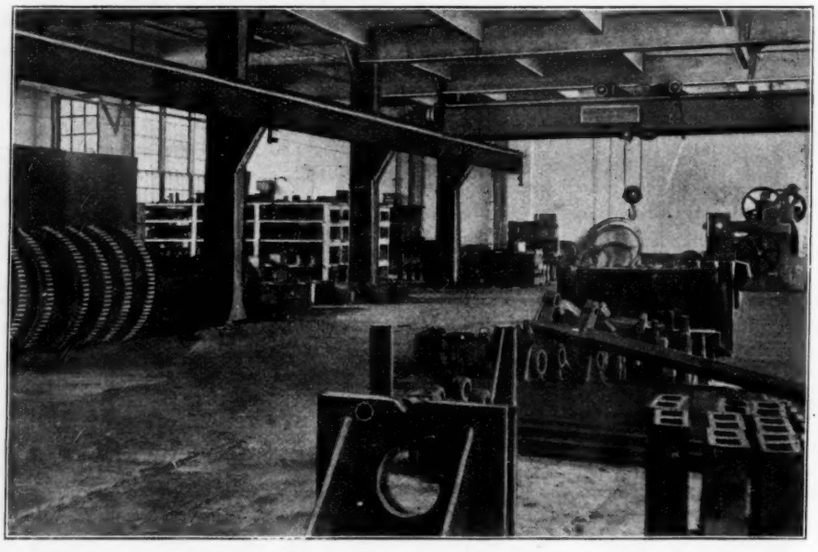


FIG. 4—ERECTING FLOOR, NEW BUILDING CLEVELAND PUNCH & SHEAR WORKS CO.

The Webster system is used for heating, steam being supplied from a plant in the old building shown in Fig. 1. The steam coils are located upon the walls just below the windows, supply pipes are carried on the trusses and under side of floor beams. The returns are run in concrete floor conduits near the wall. The conduits are covered with cast iron plates leaving the pipes readily accessible.

The toilet facilities are exceptionally good. Not only in the office but in the factory, the most approved fixtures are installed. The factory wash room is located in a well lighted and ventilated place and a double row of individual washstands is provided for use of the employes. The walls and ceilings of both floors have been given a coat of white water paint.

Both buildings are as serviceable, complete and attractive as modern methods of design and construction and modern equipment can provide. The concrete work was done by the Concrete Steel Construction Co., the steel work by T. H. Brooks & Co., both of Cleveland. Both buildings were designed and supervised by the Courtney Engineering Co., concrete engineers, Cleveland.

The Cleveland Punch & Shear Works Co. was organized about April 1, 1880, by F. W. Bruch and E. I. Leighton, as a jobbing shop known as the Excelsior Machine Works. Mr. Bruch retired in 1889, was succeeded by Chas. Hathaway, and in 1890 the business was incorporated as the Cleveland Punch & Shear Works Co. The old Excelsior Machine Works in

1889 acquired the business of John Knight, manufacturer of boiler plate machinery, which led to the formation of the company to handle a manufacturing business. In 1901 the offices of the company were moved from Hamilton street to Case avenue and they have again been moved to the present new building. The officers of the company are: President, W. D. Sayle; vice president, H. Fuller; secretary and treasurer, C. C. Swift; chief engineer, G. H. Case.

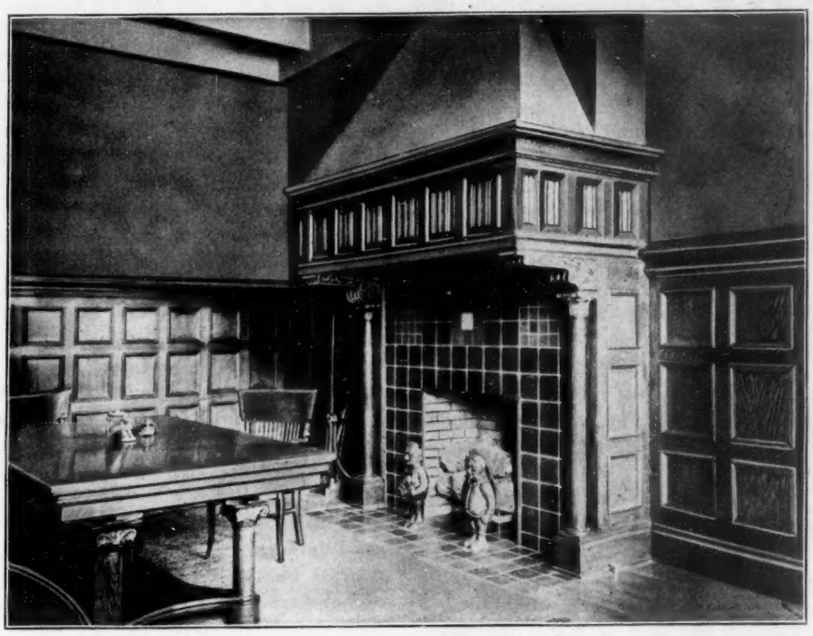


FIG. 5—DIRECTORS' ROOM, CLEVELAND PUNCH & SHEAR WORKS CO.

Shipments to Orient.—The business of the Westinghouse Machine Co. during the month of February continued to show the most encouraging signs of improvement. Quite a number of excellent orders have been received recently in the various departments. There is as a result much greater activity in the shops at East Pittsburg. Unusually large shipments are being sent from the works on export delivery, including several large steam engines. One of these shipments, consisting of five 125-horsepower compound engines, was consigned to Takata & Co., the Jananese agent of the Westinghouse companies in Tokio, for delivery to a manufacturing plant in Canton, China. Another compound engine of 500 horsepower capacity also included in this contract, was consigned to the same firm for delivery to the Southern Japanese Railway Co. of Kaisha, Japan.

STEEL CAR CONSTRUCTION AND MAINTENANCE.[1]

BY G. E. CARSON.[2]

The subject of steel car construction and maintenance is a very important one. I believe at the present time, the railroad companies and the steel car manufacturers are giving this subject more consideration than in the past, and I question very much whether I can present anything new, or even suggest that which has not been contemplated by many.

It is needless to comment on the evolution of steel car construction, for it stands before the observant as a structure of modern accomplishments. In my opinion it has long passed the experimental stage, and is now a fixed reality to which most of us point with gratification.

Now that we are confronted with the care of this equipment, we must first give careful attention to its construction.

Construction.

All sheets should be free from waves and roughness, for paint only tends to exaggerate them, giving the car an unfinished appearance. All parts should be free from flash, grease and rust before painting. In all cases when metal is placed against metal before it is riveted or concealed, the unexposed parts should be coated with a heavy paint mixture so as to exclude moisture. And during the progress of construction a competent inspector should see that the riveting and bolting together of the parts are done in a substantial and workmanlike manner.

In looking at the construction of steels cars I am often led to believe that the architect sometimes forgets the necessity of designing a structure that can be repaired with economy and despatch. From a shop view, I will enumerate a few points, as follows:

Corner posts on large hopper cars should be in two sections so that it would be unnecessary to remove the entire stake in order to make repairs to the lower portion which is damaged oftener than the top portion.

Few, if any, of the heavy capacity cars have a place of sufficient strength under which jacks can be placed to raise a loaded car without damage to the car or endangering the lives of the workmen. All 100,000-pound capacity cars should have four suitable places for jacking on each end of the car close to the body bolsters. The construction of the lower capacity cars are better in this respect.

The writer believes that all center sills should be spliced in front of the body bolsters, as it is well known that that portion of the sills between the body bolsters and end sills is most subject to damage, and if spliced the damaged sections can be removed and repaired at less cost than where it is a continuous member.

All cars should be constructed so that it would be possible to apply a train chain to each body bolster in order to haul a defective car to the shop. There are thousands of cars now in service to which chains cannot be applied.

Drop doors on heavy capacity cars should be constructed with as little mechanism as possible, and at the same time the weight should be such that a man of ordinary strength can close them, as the operating of the doors is always in the hands of the inexperienced, who often are unable physically to close some of the doors without assistance.

The floor sheets on all the cars examined are of the same thickness as the side sheets. If there is any reason for this I have not discovered it. It is recommended that the floor sheets be heavier than the side sheets, especially on gondola cars, for it is observed that the floor sheets wear and rust out long before the side

[1]Paper presented before the Railway Club of Pittsburg at its regular monthly meeting, Feb. 28.

[2]Master Car Builder, Pittsburg & Lake Erie R. R.

sheets, and when it becomes necessary to renew the floor sheets they must be separated from the side, sheets which always show signs of deterioration, especially where they join. In making repairs we cannot help but distort the rivet holes and often tear the side plates. I believe if the floor sheets were heavier the possibility of both sheets wearing out together is greater and their renewal would insure better results in workmanship and service.

It is also noticeable on all gondola cars that the floor sheets sag, forming pockets between the center sills, or in fact at any point where there is no support underneath. This, of course, is due to the deterioration of the plates or the kind of service the cars are in. During wet weather these pockets are filled with water for days at a time on account of insufficient perforation in the floor sheets, which is very injurious; the only escape for the water being through evaporation.

Maintenance.

The maintenance of steel cars will be a subject for debate for some time to come. I consider it not nearly as difficult a proposition under present conditions as the maintenance of wood cars.

The road with which I am connected has about 58 per cent steel equipment. I wish it were 100 per cent. We do not find it difficult to take proper care of it, but, of course, it is necessary to equip the plant with a sufficient amount of machines and tools suitable for the work.

I would strongly recommend that all the work be done under cover. With the thermometer near zero it is impossible to heat and straighten repair parts and drive rivets outside, and the result is that the repair plant is practically disabled. This is expensive when equipment is needed.

Probably it might be expedient to mention a few important machines and tools which the writer deems necessary to have installed in the steel car shop, coming directly under the supervision of the car department. A drill press is very necessary, especially when making repairs to foreign cars, in drilling carry irons, draft straps, foot board brackets, truck spring hangers or other parts which cannot be punched. Another tool is a flanging clamp for flanging floor sheets, side sheets, angles, etc.

There should also be a stationary riveter, to be used for riveting parts removed for repairs, such as drop doors, door spreaders, draft lugs, truck bolster top plates, stakes to side sheets, etc. I would suggest as much work as possible be done on the stationary riveters, for the cost per rivet is fully two-thirds less than if driven by hammer.

An air or hydraulic press, fully equipped with shapers or dies for the purpose of straightening different shaped material is essential.

Shears, punches, angles, flat, square, and round cutters are also necessary. A combination machine capable of performing all of this work can be procured in the open market, and when the shop room is limited it is very desirable. A device which we will term a steel car pen is not expensive, and is a paying investment. It can be used to the best advantage for jacking back cars into shape while cold, which have been twisted or bulged by accident. I recall many cases where this device has saved $30 to $50 labor per car. Of course, this structure is not intended for use in all classes of repairs.

A good sized heating furnace is another necessity and it should be sufficiently adequate to admit the largest car sheet and to accommodate about 5,000 pounds of various kinds of plates, end sills, etc. A furnace with inside dimensions 2 feet 4 inches by 8 inches by 13 feet will accommodate this amount of material. By keeping in stock a sufficient amount of new standard material it will not be necessary to keep the furnace in constant blast. I have worked very successfully by using new material to replace damaged parts, allowing the damaged parts to accumulate until there was a sufficient amount on hand to justify heating the furnace, and I have found it more economical to manage in this way. All material which is straightened or repaired is reserved in stock to be used on the next cars that come in. In front of the furnace an iron working plate about 5½ inches x 3 feet 3 inches x 10 feet should be stationed with the necessary clamps for holding the bent parts in place while they are being straightened.

In every steel car shop where there is sufficient work to warrant it, there should be an overhead crane for lifting the cars up on trestles instead of jacking, which can also be used for placing and retaining the plates until secured by the workmen. By using a crane a couple of men on the ground will handle the largest plates used, otherwise a scaffold and a number of men are necessary to raise a plate and fasten it, accompanied by more or less danger to the men.

When equipped as outlined, I have found that on the heaviest of steel car repairs two men are able to handle most of the jobs, but find it practicable to place a gang of six men on three cars and by dividing them into three gangs they can do their own cutting apart, fitting up and riveting, and are not detained by waiting for material, which in the meantime is being straightened or machined. I have operated separate gangs to cut apart, fit up and rivet, but with little success, for it is immaterial to the men who cut apart as to what becomes of the parts removed, and the gangs following lose considerable time in locating the parts when needed.

It is also wise to have stationary rivet heating furnaces in the car shop, placed so that each furnace can supply rivets to three gangs, of six men each.

Painting of steel cars is of the utmost importance, and where we have a great number of them, the repainting process is continuous. Therefore, the writer reccommends a suitable freight car paint shop, for the painting cannot be done outside in inclement weather. When equipment needs painting it cannot be neglected until favorable weather comes. As a rule, in the summer months the equipment is busy, and there is little opportunity to withdraw it from service, except in cases of extreme emergency. Newly built cars, when ready for the first painting should have all the flash and rust removed. Unless this is done the flash and paint will continue to fall off in spots as long as any flash remains. In order to remove the flash thoroughly I would recommend the sand blast. When it is not possible to use this, would suggest the dry cleaning process, by using steel scratch brushes, sand stone, or any tool which will answer the purpose, which is not so satisfactory. Following either process I would suggest the application of three coats of paint at 24-hour intervals. Later on, when repainting is necessary I again recommend the sand blast. If this cannot be done, the car should be dry cleaned and two coats of good paint applied. After taking these precautions to protect the exterior, we learn from experience that under ordinary conditions it is necessary to repaint at the expiration of about three years, and where conditions are unfavorable to the equipment, the re-

painting should be governed accordingly. I cannot be too emphatic as to the necessity of taking the proper care of the exterior, and regret that interior cannot receive the same attention, but by spraying the interior with crude oil occasionally, it may be found beneficial as a preservative. At the present time the Pittsburg & Lake Erie railroad is testing this idea.

The best of paint should be used in order to prevent rust after painting. The paint which has the greatest wearing elasticity is preferable as there is less liability for the penetration of moisture. Adhesion is just as important, and to have perfect adhesion the paint should dry from the inside out, the same as wood varnish. By using the best materials we need not fear the expansion and contraction of the plates as long as the elasticity remains.

Following are some data showing the relative cost of repairs to steel and wood cars which I am confident is correct so far as it pertains to the Pittsburg & Lake Erie equipment repaired on its lines:

100 Wood Cars Requiring Heavy Repairs.		
Cost of material		$2,521.00
Average per car	$ 25.21	
Labor and supervision		1,631.00
Average per car	16.31	
Total		$4,152.00
Total	$ 41.52	
100 Steel Cars Requiring Heavy Repairs.		
Cost of material		$3,424.00
Average per car	$ 34.24	
Labor and supervision		2,292.00
Average per car	22.92	
Total		$5,716.00
Total	$ 57.16	

I wish to mention further that a very accurate record was kept of the average number of times the different classes of cars were called into the shop for light, medium and heavy repairs, covering a period of one year, as follows:

Average number of times one wood coal car was in shop during one year	7
Average cost of repairs each time in shop	$16.23
Average number of times one wood coke car was in shop during one year	6
Average cost of repairs each time in shop.	$10.74
Average number of times one steel car was in shop during one year	1 1/3
Average cost of repairs each time in shop.	$6.74

The above figures represent the cost of material and labor less scrap credits, and is the average cost of the total repairs to 806 heavy steel cars, 1,352 medium steel cars, 9,180 light steel cars; a total of 11,338.

Wood cars were as follows: 707 heavy wood coal car repairs, 513 heavy wood coke car repairs, 3,018 medium coal car repairs, 3,354 medium coke car repairs, 12,438 light coal car repairs, 12,040 light coke car repairs;

Attention is called particularly to the number of times a steel and a wood car is called into the shop per year, and to the difference in the cost of maintenance per car. Of course, it must be understood that when the time comes to renew the steel car parts which are worn out, the figures shown will be inadequate for the reason that we are comparing steel cars with a collection of new and old wood cars, but even so, I believe, if we give the steel cars the proper care their maintenance will be less in the end than that of wood cars.

A MASSIVE TOD ENGINE FOR THE CARNEGIE STEEL CO.

An engine of unusual size and design has recently been installed by the William Tod Co., Youngstown, O., at the Ohio Works of the Carnegie Steel Co., for driving a new three-high blooming mill, which replaces a two-high mill driven by a 45 x 72-inch twin cylinder reversing engine built by the same makers a number of years ago. This engine is of the tandem-compound Corliss type with long range cut-off gear, and has steam cylinders 52 and 90 inches diameter and 60 inches stroke. It is believed to be the largest tandem compound engine ever built and is said to be the only engine regularly transmitting over 8,000 horsepower through a single crank pin.

The unusual size of the engine appears also from the following general dimensions: Total length, 71 ft.; height of low pressure cylinder above foundations, 13 feet; height of center of engine above foundations, 6 feet 11 inches.

Owing to the extremely heavy and variable service which this engine has to perform, a special type of cut-off gear was required. The power required for certain passes of the ingot greatly exceeds the power which can be developed in the steam cylinders, and it was necessary to provide for this deficiency in the design of the fly wheel, the engine of necessity slowing down during the rolling periods, recovering its speed while running light. The governor must therefore regulate quickly, and at the same time have great stability to prevent racing, since the engine will develop 8,000 horsepower at rated speed and will bring the wheel back

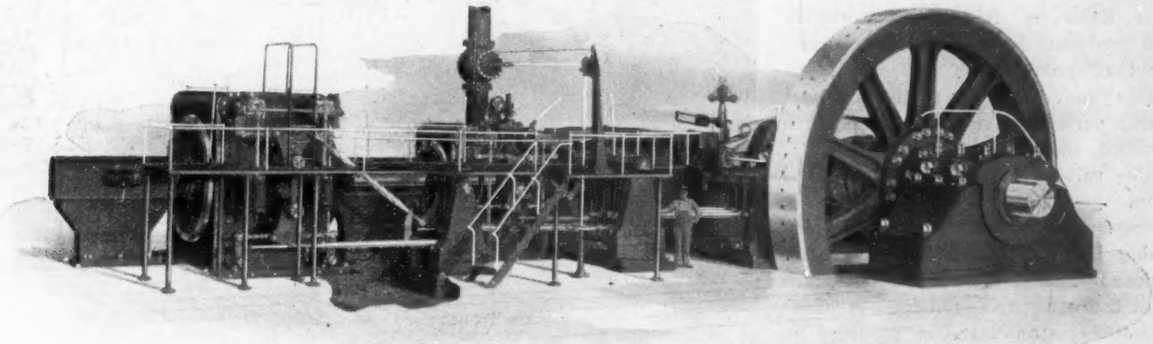


Fig. 1—Horizontal Tod Tandem Compound Corliss Engine for Carnegie Steel Co.

to full speed in about two revolutions.

The range of cut-off is from nothing to full stroke, and as the usual expedient of giving the steam valves negative lap was not permissible on account of the danger of the engine running away in case of a derangement of the dash pots, a floating trip gear was adopted. The governor can release the steam valves at any point of the piston travel, but the steam valves are positively closed by the wrist plate at the end of the piston stroke, so that in no event can steam at boiler pressure pass directly to the low pressure cylinder, as is the case with the usual "double eccentric" type of gear.

The steam valves for both high pressure and low pressure cylinders are driven from a single eccentric, while the exhaust valves on each cylinder have a separate eccentric, thus departing from usual practice and providing for the separate adjustment of compression and release in each cylinder. Owing to this arrangement, perfect valve setting has been attained in both cylinders.

The valve gear rockers are inverted from their usual position and hang downward. The carrier rods tend to swing pendulum fashion with greatly reduced wear and tear as compared with the usual arrangement. A hand-operated piston valve is provided in a convenient position, by means of which the engine may be turned by hand in either direction.

The crank shaft is 30 inches diameter in the bearings and 36 inches diameter through the fly wheel. It is a hollow steel forging. The fly wheel is of extra heavy construction. The rim is in two parts and was cast with the arms. The latter, however, are separated at the center to eliminate shrinkage strains. The arms are of H section, giving extreme rigidity. The hub is of cast steel. The complete wheel weighs 250,000 pounds, and is 25 feet in diameter.

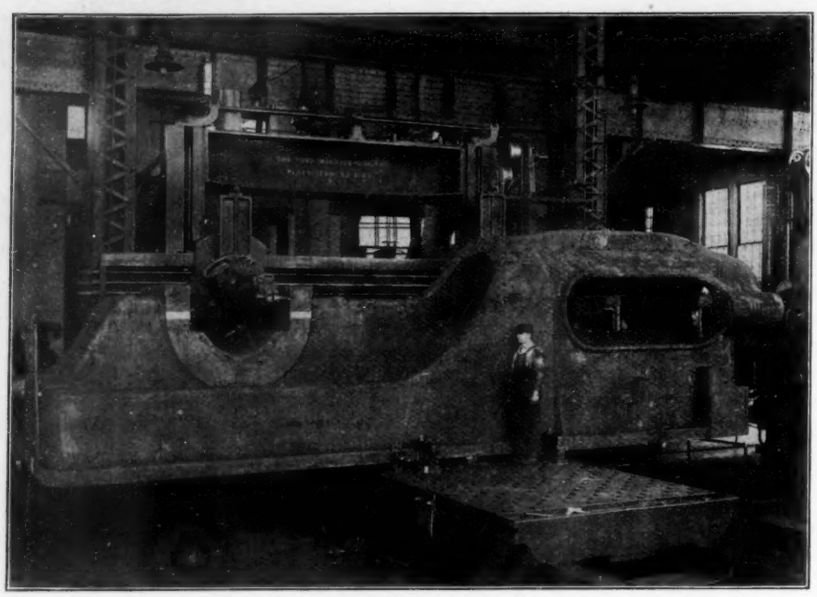


FIG. 2—ENGINE BED ON PLANER.

The connecting rod is of the "marine" type with babbitt directly in the rod at the crank end, and a solid end with bronze boxes at the crosshead. The crosshead is of cast steel of the lightest construction with adjustable shoes. The bearing surface is 30 inches x 60 inches.

The pistons are both of steel, of the umbrella type which has been the standard practice of the William Tod Co. for several years. Pistons of this type of large diameters have been in successful operation for some years, and have proved entirely satisfactory. The high pressure piston rod is 11 inches diameter and is solid, while the low pressure piston rod is 15 inches diameter and is hollow. Both pistons are carried free from the cylinders, the rods being cambered and supported on sliding heads. The construction is such that easy access may be had to both cylinders without disturbing any tie pieces or heavy parts of the engine. The low pressure cylinder is provided with a manhole in the back head.

A special feature of the design is the direct attachment of both high pressure and low pressure cylinders to the bed plate. The high pressure cylinder is secured by studs to the flange of the bed plate, while heavy forged steel tie bolts 13 inches diameter extend from lugs on the bed plate to sockets in the low pressure cylinder head. The tie bolts pass alongside the high pressure cylinder but are entirely free from it. By

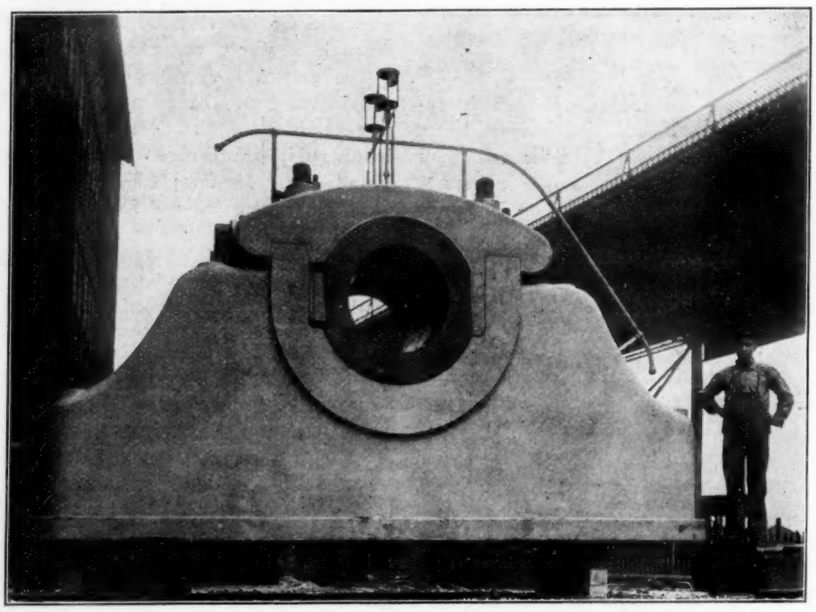


FIG. 3—THE OUTBOARD BEARING.

this construction the expansion and contraction of each cylinder is taken care of separately, and in operation no perceptible motion of either cylinder occurs. The sole plate under the cylinders is of the heaviest construction. It simply maintains the alignment of the machine, both cylinders being free to slide upon it. The main bearing, which is 30 inches diameter by 58 inches long, is cast in one piece with the guide barrel. The finished bed plate weighs 95 tons. Fig. 2 shows its massive proportions.

The back bearing is similar in design to the main bearing and is secured to the foundation by numerous foundation bolts. Fig. 3 cut shows clearly the construction of these bearings. They are provided with four shells which are rigidly locked in place by the cap, which is re-inforced by two horizontal bolts. A liberal channel around the edge of all main castings entirely prevents oil from reaching the foundation.

As may be seen from Fig. 1, the enormous size of the engine demands a special arrangement of operating platforms around the valve gear. This platform 7 feet above the floor line, leaving ample room underneath for access to the lower valve gear.

THE MANUFACTURE OF CONCRETE BRICK FROM BLAST FURNACE AND OTHER SLAG[1]

By Josiah Butler, M. I. Mech. E. (Swansea.)

The important question of the utilization of the waste material produced by blast and other furnaces has seriously occupied the consideration of experts for some time past, and this paper deals briefly with a method of utilizing this waste material profitably. We have first to consider the fact that all slag made by the present blast furnaces costs from 8 to 12 cents per ton of iron produced to convey it to the slag dump, this cost not including any rental on the dumping ground. In a furnace producing 800 to 1,000 tons per week, the cost of removing the slag only would be $5,000 per annum. On account of the large amount of lime and silica contained therein, blast furnace slag is a most valuable brick making material.

It is proposed to show that instead of removing the slag to the dump, that by running it in its molten state into water, and there granulating it, a first-class brick making material is available. The excess lime in the slag causes it to granulate easily in direct contact with water, which converts all free lime into a fixed state, and at the same time eliminates all free sulphur from the slag. The ease with which the slag is granulated saves considerable expense, no grinding being necessary as with other slag and dust destructor refuse. A great number of plants are in active operation on the continent manufacturing brick from blast furnace slag.

In 1904, a small plant was erected at the Landore Works of Messrs, Baldwins, Ltd., capable of producing about 8,000 brick per day of nine hours, as an experiment. The experimental plant consisted of a rough granulating arrangement, a furnace for drying the granulated slag, a conveyor and lime slacking plant, measuring machine and elevators for lifting the mixture to an edge runner grinding mill, used for mixing and serving a pulverizer which fed the brick press from the mixing pan. The press was a vertical one with a revolving table, having a vertical upward pressure on the 4½ x 9-inch face to form the brick, and one steam hardening chamber. The brick produced by this experimental plant has proven so satisfactory as a building material that a much larger plant has been constructed at the Landore Works on the German principle, with a daily output up to 45,000 brick.

Granulating Plant.

The granulating is done by running the molten slag into a bosh of water about six times the volume of the slag. The back-water from the furnace, tuyers and coolers is used for this purpose. The excessive quantity of lime contained in the slag causes it to split up immediately upon contact with the water and all trace of unspent and free lime is entirely eliminated from the slag. The free sulphur at the same time is carried off by the great volume of steam generated in consequence of the intense heat of the molten slag falling into the water. The slag being thus granulated, is flushed down a culvert into a receiving dump at the bottom of an elevator erected at some distance from the blast furnace, which conveys it to a number of heavy squeezing rollers which separate the water from it and crushes any coarse particles of slag existing. After passing through these squeezing rolls, it drops into a hopper truck which conveys it to stock bunkers at the brick works.

Lime Grinding House.

For the manufacture of brick from blast furnace slag, white lime containing no more than one-half of one per cent of magnesia, has been found to be the most satisfactory. The lime in the unslacked state is put through an ordinary jaw crusher and ground in a ball mill to pass through a mesh of about 8,000 per square inch. The slag and unslacked lime in their proper proportions (95 to 93 per cent granulated slag and 5 to 7 per cent lime) are taken to the top of the building and conveyed to a silo, capable of holding enough material to make 1,000 brick. The silo when filled is dropped into a preparing machine with a steam jacketed chamber and containing pulverizing blades working on the principle of a Root's blower. The heat generated from the steam jacketed chamber sets up the reaction of the hot lime, which produces in the brick at this stage sufficient hardness to enable it to be handled satisfactorily by the operators of the brick press and hardening chambers. After the mixture has been thoroughly worked, and the lime sufficiently incorporated into the granulated slag, the mixture is let out on the first floor above, and there served to the machines as required. After being pressed into their requisite shapes and sizes, the brick are placed in flat-topped trolleys, holding about 700 to 900, and taken to the steaming chambers, where they are allowed to remain for 12 hours.

After the steam is turned off and blown as far as possible into the next chamber, which should, by this time, be ready to receive it, the brick are taken out and loaded into trucks ready for use. It is found that

[1]Abstract of a paper presented before The Staffordshire Iron & Steel Institute, Dudley, Eng., Jan. 18, 1908.

at this stage they are sufficiently hard to endure rough handling, the steam in the chambers having started the reaction in the lime in a very rapid manner, enabling the brick to be used on construction work as soon as they are cold enough to be handled.

Uniformity of Slag.

No uniformity of mixture can be expected from dust destructor refuse, because it is essential in the first place to get rid of any material that happens to come along. With a possibility of a sudden change in the material with which the furnace is charged, brick made from this refuse are liable to be of different composition, and therefore of various colors, which would be detrimental in either case in a brick for house building. The same applies to brick made from ground up slag, coming from zinc seconds, or slag from zinc retorts, or any other metallurgical composition. Blast furnace slag, however, is necessarily somewhat uniform in quality, as otherwise the quality of the iron would be affected. Therefore, if the quality of the iron be right, which, of course, is the first object of the blast furnace, it necessarily follows that the resultant slag would be of a gray color and suitable for granulating. It will be understood that all brick made from this slag uniform in quality would necessarily be uniform in color, an improvement on brick made from dust destructor and other refuse slags. The granulated material obtained from black slag would contain a certain percentage of unreduced iron, so would require a much larger percentage of added lime to form a suitable concrete brick. Therefore, in the event of a furnace turning out black slag, it is better to remove it to the dump, rather than have varying colors in the brick.

Preparation of Material.

One of the most important points to consider is the careful preparation of all materials used in the manufacture of brick. It is important to have perfect uniformity in all materials used and this must be strictly adhered to. The following points must always be born in mind: 1. The uniformity of all material to be worked up. 2. Uniformity in mechanical composition, which controls the mechanical action of the lime and slag in the brick. 3. Uniformity in the thorough slacking of quicklime to hydrate of calcium. 4. Uniformity in the proportion of lime to granulated slag in the mixture. 5. Uniformity in the physical properties of the mixture to be pressed, having chief regard to its capacity for lending itself to pressure.

The capacity for complete combination of the materials is dependent entirely upon the mode of preparation of the materials to be employed. It is only by carefully following out and fulfilling the above conditions that a concrete brick plant can be expected to work successfully, for the regularity of the working would vary in proportion to the degree in which any of the above conditions are not complied with. A deviation from any of these foregoing conditions would necessarily cause a corresponding irregularity and possibly an interruption of work. The first two conditions refer solely to the physical and chemical proportions of the crude material, but a careful examination of local conditions must be thoroughly made before answering the question of the advisability of erecting a concrete brick works. It must first be ascertained whether a sufficient regular supply of suitable and uniform quality of slag is available for the purpose of brick making, and whether the slag can be obtained without difficulty at a normal cost. The amount of slag required in the granulated form is about three tons per 1,000 brick. The lime employed must be, as far as possible, a pure, fat, white lime, and must necessarily contain in the slacked condition as high a percentage of oxide of calcium as it is possible to obtain. This should certainly not be under 92 per cent. The admixture of clay or magnesia, which is supposed to impart so-called hydraulic properties to the lime, is detrimental, and any appreciable quantities of such mixtures will make the lime unworkable.

In reference to the slacking of the lime we must distinguish between two methods. 1. The slacking of lime alone without the presence of granulated or ground slag. 2. The slacking of the lime simultaneously with the mixing of the slag. In the first method many advantages which alone are offered in the latter method, are entirely lost. One point that has an important influence on the composition of a suitable molding material, is the conversion of burnt lime into hydrate of lime, which takes place by 100 parts of burnt lime absorbing 32 parts of its weight of water, which combines chemically with the lime, generating considerable heat. The author, therefore, contends that the process in which unslacked lime is used for the purpose of mixing with granulated or ground slag, is much more suitable in all cases where the granulated slag carries a certain amount of water or moisture. The moisture, however, should not exceed 10 per cent in the process under consideration.

The mixture is immediately placed in a steam jacketed preparing machine in which the best results only can be secured. Immediately the mixture is made it necessarily follows that the unslacked ground lime commences to absorb moisture from the granulated slag, and heat is at once generated. The process is greatly accelerated by the introduction of the mixture into the steam jacketed chamber, which sets up a rapid reaction, even before the brick is made. The employment of the steam jacket not only increases the plasticity of the mixture but also insures complete slacking of the burnt lime, a very important point. Another important feature of the steam jacketed chamber is that the burnt lime is completely slacked in about five minutes, whereas, under ordinary conditions, complete slacking of the lime would occupy from 10 to 20 hours.

Since the presses always work the material with due regularity, the perfect arrangement of the mixing blades in their action upon the mixture has shown that a period of 10 minutes would be sufficient to insure a proper degree of mixing, but to make doubly sure that the operation of mixing is properly accomplished, from 20 to 25 minutes should be allowed for this operation. This insures the proper proportion of the material in the steam jacketed chamber, and the formation of isolated pellets of lime is entirely avoided, rendering further handling of the material through a crushing chamber unnecessary. The structure of the finished brick is so perfect in its formation that no particles of lime can be discerned. Should it be desired to add any coloring matter, for the purpose of obtaining a finished brick of a certain shade, such coloring matter can best be added at the time of making the mixture.

If the plant is steam-driven the engine exhaust is used for the steam jacketed preparing machine, consequently, the steam consumption for heating purposes need not be considered so far as cost be concerned. One of the principal features to consider in the manufacture of brick is the necessity of having machinery, which, in case of mishap, is quickly adjustable, and possesses the faculty

of being adaptable to all conditions of work to which it may be put.

Hydraulic Press for Testing.

A noteworthy feature in connection with the brick plant above described, is the press for testing brick. The ram is so arranged that its area is equal to the 9 x 4¾ inch face of the brick to be tested, which is always placed upon the ram table with a loose block of iron equal in size on top of the brick. The press is worked by a ram of 2¼ inches diameter, actuated by a ratchet lever, the top of this ram having a ¼-inch pitch square thread cut in it. Two 12-inch hydraulic gages are connected to the cylinder to indicate the pressure exerted on the brick; each gage reads up to 8,000 pounds per square inch. The apparatus shows what each brick will stand, a condition which must be invariably guaranteed. The tables below are abstracted from the test sheets:

placing these brick in a freezing chamber direct from the steam hardening chamber, and they have been left there to freeze for 12 hours. Immediately the brick were removed from the freezing chamber, they were boiled and then frozen again, and at the end of this drastic treatment, they did not show the least sign of detriment.

Tests have also been carried out with the object of ascertaining the amount of moisture which these bricks can absorb, and the following tables VI and VII show the result of the tests. It will be noted that the brick absorb less moisture as they get older. The tests also show that the brick made from blast furnace granulated slag, compare favorably with ordinary red brick. It will be observed, however, that the brick H, J and K, made from ground up zinc slag, are far from satisfactory, as the porous condition of these brick can only be put down to the unsuitable mechanical mixture of the material from which they are made.

The following table is an estimate of the cost of granulated slag brick, which compares favorably with the cost of manufacturing the ordinary red clay brick against which slag or concrete brick will have to compete.

Table I. Slag and Refuse Brick Tests.

Date of test	Made by	Material made from	Age of Brick	Cracked at lbs. per sq. in. on brick	Crushed at	Mark on Brick	Total tons crushing on brick	Remarks
9 | 9 | 07		Zinc Slag and Lime	New made	1000	1200	H	21.3	Just out of chambers
do.		do	do.	1000	1200	J	21.2	do.
do.		do.	do.	1000	1500	K	22.8	do
do.		do.	7 months	500	650	L	11.45	7 months out in the weather
do.		do.	7 months	500	700	M	12.35	do.
do.		do.	7 months	550	750	N	13.2	do.
do.	Baldwins Ltd.	Granulated B. F. Basic Slag and Lime	40 do.	2000	2200	O	38.7	do.
do.	Landore	do.	40 do.	1300	3100	P	54.3	do.
do.	Baldwins Ltd.	do.	40 do.	1300	2500	Q	43.9	do.

Table II. Slag and Refuse Brick Tests.

Date of Test.	Mark on Brick.	Made by	Composition of Brick.	Age of Brick.	Cracked at lbs per	Crushed at sq. in	Total tons crushing on brick.	Remarks.
9 | 9 | 07	A.	Baldwin's Ltd.	B. F. Slag and Lime,	12 months	1600	2400	42.3	Basic B. F. Slag
do.	B.	Baldwin's Ltd.	do.	9 months	2000	2200	38.8	do.
do.	C.	Baldwin's Ltd.	B. F. Slag, Lime and Breeze	30 months	1200	3100	54.7	do. (stopped test)
do.	D.[1]		Zinc, Slag and Lime.	1 month	300	900	15.8	Ground up Slag White Salt in Brick and on Face[2]
do.	E.		do.	do.	1600	1200	21.1	do.
Nov., 1906	S.		B. F. Slag and Lime from Baldwins Ltd	from steam chambers	2000	2200	38.8	Baldwins B. F. Slag.
Aug., 1907	T.		do.	9 months	2200	3300	58.1	do.

[1] See analyses Table III.

[2] See analysis Table V.

Labor Cost, per 1,000 Bricks.

Men.	Occupation.	
1.	Granulating slag	$ 1.12
1.	Lime grinding house	1.12
1.	Loading bogies at bottom of hoist	1.00
1.	Discharging slag	1.00
1.	Discharging coal for boilers, etc.	1.00
1.	Discharging at top of hoist to silo	1.00
1.	At preparing machine	1.12
2.	On floor above presses feeding machine	2.00
2.	On presses removing molded bricks	2.25
4.	To load molded bricks on bogies	4.00
4.	Hardening chambers and discharging	4.00
1.	Stoker and engine man	1.62
1.	Foreman	2.00
1.	Fitter or blacksmith	1.50
1.	General laborer and spare man	.87
23	Total labor, cost per day..	$25.60

Say, 25,000 per day, at $25.60 or $1.02 per 1,000 brick.

Cost Sheet per 1,000.

A.	Cost town water per 1,000 bks 500 gallons	$0.06
B.	Cost coal per 1,000 for hardening chamber	.36
C.	Cost coal per 1,000 for steam to engine	.28
D.	Cost of lime per 1,000 say	.50
E.	Cost sundries, stores, oil, wear and tear, etc., per 1,000	.25
F.	Office charges, rates and taxes, etc., also traveling expenses, etc., per 1,000	.37
G.	Cost traffic charges, etc., per 1,000	.12
H.	Depreciation on building and plant, say, per 1,000	.25
J.	Cost labor, per 1,000 bricks, say	1.03
K.	Int. on $58,000 @ 5 per cent	1.15
L.	Charge for granulated slag and delivery of same, say 3 tons	.37
M.	Royalty per 1,000 bricks	.25
	When making a daily output of 25,000 bricks, total cost per 1,000	4.25

If plant were kept operated night and day, and producing say 45,000 bricks in 24 hours, then the above standing charges would be as follows:

Office charges, etc.	.208
Interest on capital	.222
Depreciation	.143
Foreman to have charge of two shifts	.037
	.610

With an output of 45,000 bricks per 24 hours the total cost would be $3.13 per 1,000.

In conclusion, although it is not expected that these brick should be capable of resisting the action of fire, yet it can be safely said that they can withstand a greater heat than ordinary red brick. In several instances previously quoted these bricks have been used for work in which they have been exposed to high temperatures without detriment. As an instance, in the outer walls of the regenerators of steel melting furnaces, where the thickness was 18 inches and 2 feet 3 inches, only 9 inches of fire brick was used on the inside. In these cases there was less buckling or distortion than with those built with red brick. Another case may be cited where some houses were built, the lower portion of concrete brick, the upper of red brick. This property was destroyed by fire, and it was found that the red material was badly twisted and dis-

As regards the effect of frost on such brick, it can be safely stated that it has no effect whatever upon them after the reaction of the lime has been set up. Tests have been made,

torted, and had to be taken down and rebuilt, while the lower portions, which were built of concrete brick, remained firm and intact, and showed no detrimental effects from the great heat to which it had been subjected.

Discussion.

This paper excited considerable discussion, of which a synopsis is given below.

W. J. Foster said the matter was of great importance to blast furnace men, because slag with many of them was a waste product, which they had to pay to remove, and they would be only too glad to adopt any process for utilizing it. He would like to know the cost of the installation of a plant capable of manufacturing 45,000 brick in 24 hours. He would like to know also whether there was any intention to put down machinery in England or Germany. He understood that the lime slag was the best for the purpose, but what were they to do with the lean slag or "black" slag, and even with the very limy slag, which might be liable to disintegration. It might require two or three machines to deal with the slag from one blast furnace.

James Donechay said that as long as 25 years ago, he remembered brick being made from blast furnace slag. But within a certain time the brick cracked, and the air got through. A serious trouble would be the difference in the proportion of lime, some slags having 25 per cent and others 40 to 44 per cent. In the north of England, they used to grind slag and make mortar of it. The durability of the bricks depended on the proportion of lime, phosphorus and sulphur. If they got a slag high in lime, naturally, in time, it would decay, and if it was high in phosphorus, it would be liable to become brittle. But a serious trouble would be the variety in the working of the furnace which produced such differences in the slag. The case was very different in the north where Spanish ore was used, and hard coke. He was very certain that the task of brick making in the Midlands would be a difficult one.

J. Paterson thought that the new idea should be more useful in South Wales, especially in Swansea, and to a firm like Baldwins. But the whole thing would have to be scientifically worked out before it could be satisfactory. He had some experience in brick making many years ago, having made millions of brick and spending about $300,000. The experiment proved in the end an absolute failure, and the plant had been pulled down. It might possibly be that the causes of failure were to an extent scientific, and he believed that the brick used with cement were successful.

Mr. Paterson considered the manufacture should pay well. Many years ago

Table III—Analysis of Concrete Bricks Shown in the Test Sheet "B."

	Brick B. Per Cent.	Brick D. Per Cent.
Lime	38.343	11.950
Silica	31.150	53.480
Calcium Sulphide	2.774	
Peroxide of Iron	.176	3.971
Suboxide of manganese	1.842	.156
Alumina	10.413	8.663
Sulphur		.737
Carbon di-oxide and combined water	13.900	19.820

Table IV—Analysis of Blast Furnace Slag (Basic).

	Ordinary Slag. Per Cent.	Granulated Slag. Per Cent.
Silica	33.900	34.710
Lime	44.060	44.030
Oxide of manganese	1.909	2.160
Sulphur of Lime	4.160	3.690
Protoxide of Iron	1.160	.800
Alumina	11.600	11.400
Magnesia	3.090	3.106
Total	99.879	99.896

Table V—Analysis of Salts Forming White Deposit on Brick.

	Per Cent.
Peroxide of Iron	.120
Alumina	1.020
Lime	3.540
Silica	3.630
Sulphuric acid	27.802
Soda	18.232
Water	44.600
	99.940

he had tried a little experiment by mixing hematite slag with a little ash in many thousands of brick, and a number of houses were built with them. This was 27 years ago, and the houses were still standing, and in a satisfactory condition.

W. H. Carder recalled an experiment made many years ago by Charles Wood, of Middlesbrough, who was actively engaged in the manufacture of slag brick. He would like to know whether they were still being used for house building. His own impression was that all bricks of a vitreous or vitrified character were damp, owing to the fact that metallic bricks would absorb and retain moisture, and would also cause rapid condensation of the air. They could test that any time by examining the London & North Western railway bridges, which were built with blue bricks. In the hottest day of summer blue brick would be damp. The promoters would have a long row to hoe in competition with the red bricks.

In regard to the price, $3.75 had been mentioned as the bed-rock price at which the brick could be produced. But no allowance had been made for stoppages and breakages of machines. Whenever the furnace worked badly, the increase in the cost of the brick would be 50 per cent. The cost of red-brick in the district was now about $5 per thousand, so that the slag brick would be at a disadvantage. There was scope for an investigation, to find out whether it was possible to get a better price than by cracking the slag for road purposes.

R. Buchanan thought the prospects of success would be greatly increased, at large establishments where there were a number of furnaces, than where there were only one or two. One great advantage would be that the makers of the brick would get rid of the fumes of smoke at present so common in brick making. It was quite true that the brick would absorb more water than the ordinary red bricks, and if the frost came upon the moist brick, scaling was bound to take plake. He believed the successful production of slag bricks to be a matter

Table VI. Soaking Test.

Distinguishing Marks	Composition.	Weight before. lbs.	Weight after. lbs.	Per cent moisture to total weight	Hours Soaking	Age of Brick Months	Remarks
Brick same as O, P, and Q	B. F. Slag and Lime	8	8.75	12.5 %	50	40	Taken from Stock
Brick same as H, J, and K	Zinc Retort Slag and Lime	7.437	8.25	10.92%	50	New	do.
Brick same as A	B. F. Slag and Lime	8.25	9	9.09%	50	12 Burnt	do.
Brick same as G, I	Wire Cut Red Brick	8.25	9.312	9.58%	50	Brick	do.
Brick same as T	B. F. Slag and Lime	7.562	8.5	12.4 %	50	9	Dried in oven before soaking
Brick same as H, J, and K	Zinc Retort Slag and Lime	6.312	7.875	24.75%	50	New	Dried in oven after steaming

Table VII. Burnt Clay Brick Test.

Date of test.	Mark.	Total tons crushing	Composition.	How made	Cracked at lbs. per	Crushed at sq in.	Remarks.
9 | 9 | 07	F.	70.5	Staffs. Clay	Pressed	400	4000	Stopped test at 4000 lbs.
do.	G. I.	31.1	Red Brick	Wire Cut	250	1200	Used for chimney Stacks and General work.
do.	G.	35.2	do.	Pressed	200	2000	For Tunnel Work and General Work
do.	R.	30.0	do.	Pressed	300	1700	Used for Chimney Stacks and General Construction.

of the greatest importance to blast furnace men.

Mr. Butler, replying to the discussion, said that his calculation of outlay was $40,000 for the plant and $10,000 for the building, depreciation on the building being 2 per cent, and 5 per cent on the plant. Replying to various questions, the speaker said that the slag might be somewhat limy. With regard to "black" slag if it was very bad, they sent it right away to the dump. For good qualities they took care to mix well with a pulverizer. Of course, it was understood that a black slag must require more lime.

With regard to the working of the scheme, the plant had been started by a German syndicate. The speaker agreed with Mr. Paterson that a mixture with ashes would make a suitable brick. With regard to scaling he had built a wall a long time ago two days after bricks were made, and they were not even put in the hardening chamber. Yet they had shown no ill effects from the frost. He had no doubt that the hardening chamber would cure them. In a couple of months, he would be able to show them some of the structures about which he had been talking. It was quite true that whole rows of houses had been satisfactorily built in Barrow-in-Furness. Any dampness, he thought, was probably due to imperfect mixing.

Mr. Davis said that at Middlesbrough the bricks were being cast into molds, but they were very inferior and never sound. Mr. Paterson pointed out that a great deal of the paving in Darlington was produced from slags in a very similar way. W. J. Foster thought they could dismiss from their minds any idea of disintegration from age.

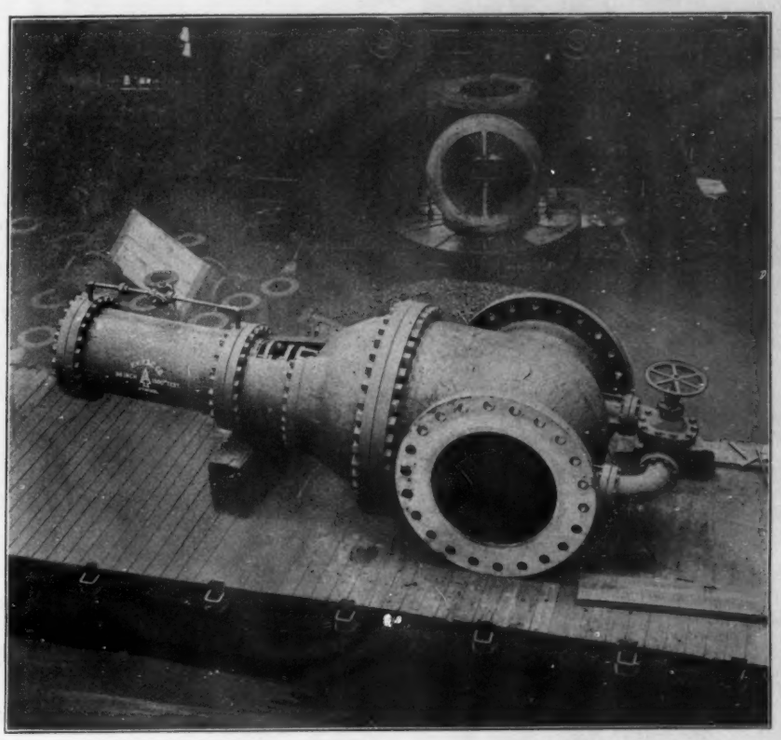
Mr. Butler, continuing, said he had no doubt in the world about the success of the slag brick.

Those who built the plant were going to build others, probably five of them, and the first was only an object lesson. He did not want to commit himself too much at present. At the same time, he believed other people could get just as successful conditions, and then it was a question of proper mixing. They had only to mix the material, and time would do the rest. That was the principle upon which they meant to go, and he believed that to an extent that was the principle upon which the old Romans built the walls which had outlasted many generations.

The Ohio Falls Iron Co., at New Albany, Ind., has resumed operations with about 600 employes in its rolling mill department. The plant has been idle most of the year, but is now said to have some large orders ahead.

AN UNUSUAL FEAT IN VALVE CONSTRUCTION.

The accompanying illustration shows an interesting and unusual example of valve construction. It is one of an order for 30-inch and 36-inch valves especially designed and built by the Pittsburg Valve, Foundry & Construction Co., Pittsburg, for Messrs. Sanderson & Porter, engineers of New York city, for use in a hydraulic power plant which they installed for the Union Construction Co., at Angels, Calaveras county, Cal.



36-INCH VALVE FOR UNION CONSTRUCTION CO.

The working head in this plant is 1,500 feet or 650 pounds per square inch. On account of the unusual line strains 1,500 pounds per square inch test was specified. To meet these excessive requirements more than ordinary care had to be taken in both design and manufacture of these valves.

The general lines follow the well known parallel seat wedge type used by the Pittsburg Valve, Foundry & Construction Co., for water gates and included the use of double stems and actuating cylinder. The castings were steel throughout; mountings, stems, wedge mechanism, piston and cylinder lining were special bronze. All surfaces exposed to pressure were either cylindrical or segments of spheres. On account of the high pressure it was considered advisable to substitute a hydraulic cylinder for hand operation. Weight being a great consideration on account of the handling at the power house, it being located about 12 miles from the nearest railroad, the size of the cylinder was reduced and a specially designed hand pump supplied to start the valves from their seats, after which the cylinder furnished ample motive power.

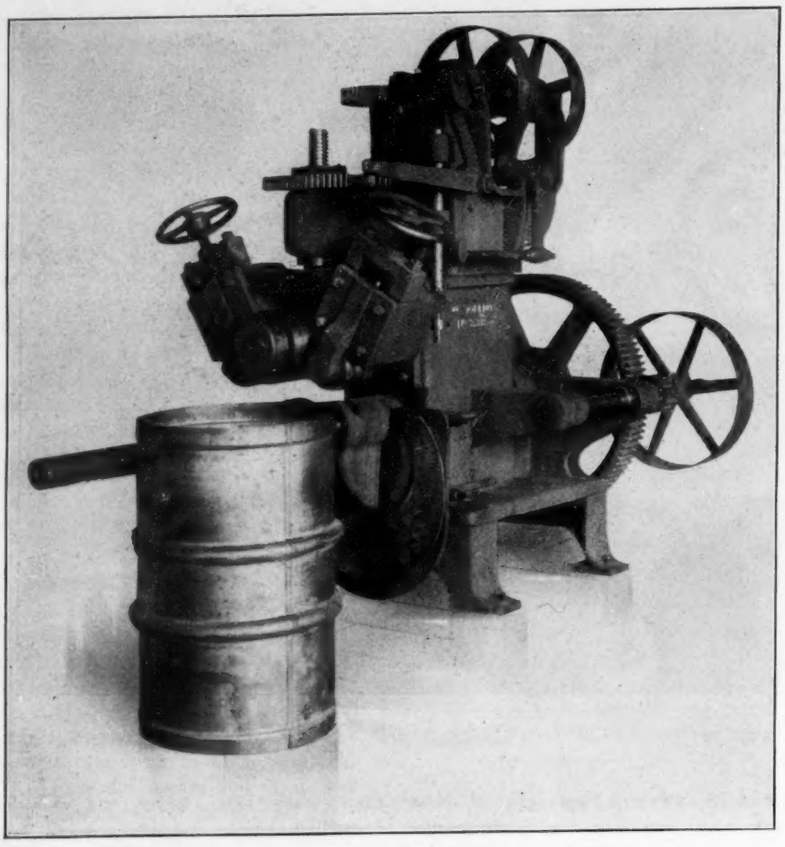
An idea of the stress under test can be gathered from the following data: Total pressure on discs, 2,078,000 pounds; stress on joint between body and bonnet, 2,714,000 pounds; pressure on piston to open and close valve, 596,000 pounds. The shipping weight of this valve was 36,000 pounds.

Bids are wanted by the board of public works at Ft. Wayne, Ind., for furnishing and laying 250 tons of 12-inch, 100 tons of 8-inch and 50 tons of 6-inch cast iron water pipes. J. F. Frank, city clerk, can furnish further details.

The Indianapolis Water Works Co. will lay several miles of new water mains during the spring and summer months and extensions will probably be larger than they were in 1907.

A MACHINE FOR SWEDGING STEEL BARRELS.

We illustrate herewith a new machine designed for swedging or rolling the large beads on steel oil barrels, and also the shoulders at each end for supporting the heads or ends. This machine is fitted with two parallel shafts connected at the rear end with gears. These shafts support the upper and lower swedging rolls, the rolls being made of tool steel and hardened.



MACHINE FOR SWEDGING HEADS ON STEEL BARRELS.

The cylinders are first prepared in their plain smooth shape and placed in position on the machine, supported by the apron in front of the machine which acts as a guide and which is made adjustable.

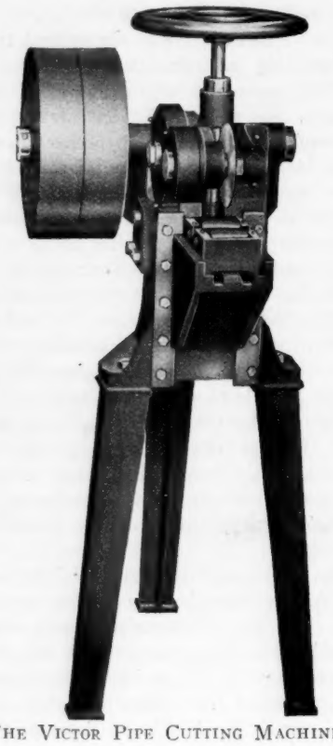
The machine is fitted with an automatic lifting attachment operated by reverse clutch mechanism which necessitates starting only by the operator. The upper shaft or head then descends automatically to the work and finishes the swedging or rolling of the beads, when the clutch is automatically reversed by striking a stop which is set at the correct position at the lower end of the travel of the head. This stop automatically reverses the lever which throws the clutch mechanism to the opposite side, and the head then is elevated to the required height where it is stopped automatically.

It requires about one minute to roll or swedge each bead or shoulder. The machine, therefore, can finish barrels at the rate of about 30 per hour. It has capacity for working metal as heavy as No. 14 gage varying in diameter from 12 inches to 36 inches. The machine is known as the "Toledo" No. 336 swedging machine and is designed and built by the Toledo Machine & Tool Co., Toledo, O.

Gas Engines for Steel Foundry.—During January, the Duquesne Steel Foundry, which operates a large plant in the Pittsburg district, decided to adopt the gas power system to operate the works formerly driven by steam. The initial equipment will consist of a 400-horsepower Westinghouse gas engine of the 3-cylinder vertical enclosed type, direct connected to a 240-kilowatt generator which will furnish current to the various motor drives around the plant.

THE VICTOR PIPE CUTTING MACHINE.

The accompanying illsutration shows the Victor pipe cutting machine manufactured by the Dayton Machine Works, Dayton, O., and marketed by the Patterson Tool & Supply Co., Dayton, O. It is designed and built for the cutting off of all kinds of tubing, gas and steam pipe to any length and ranging in size from ¼-inch to 2 inches inside diameter. It does the work quickly and makes a true cut, insurng a good start for a straight thread. It leaves but little burr on the inside of the pipe. The machine is generally placed at the end of a plumber's or steam fitter's work bench, which supports the long end of the pipe when it is placed in the machine. If necessary the pipe may rest in a V-block on the bench to lessen the friction on the pipe when being cut. When in this position it is only necessary to bring the point at which the pipe is to be cut directly under the cutter of the machine and bring the cutter in contact with the pipe by turning the hand wheel at the top. The cutter is of the rotary type and its motion rotates the pipe. It is driven by means of gearing. The pipe rests upon the lower rolls in the table, which are of tool steel hardened. The frame on which they are mounted is adjustable and so constructed that the rolls can

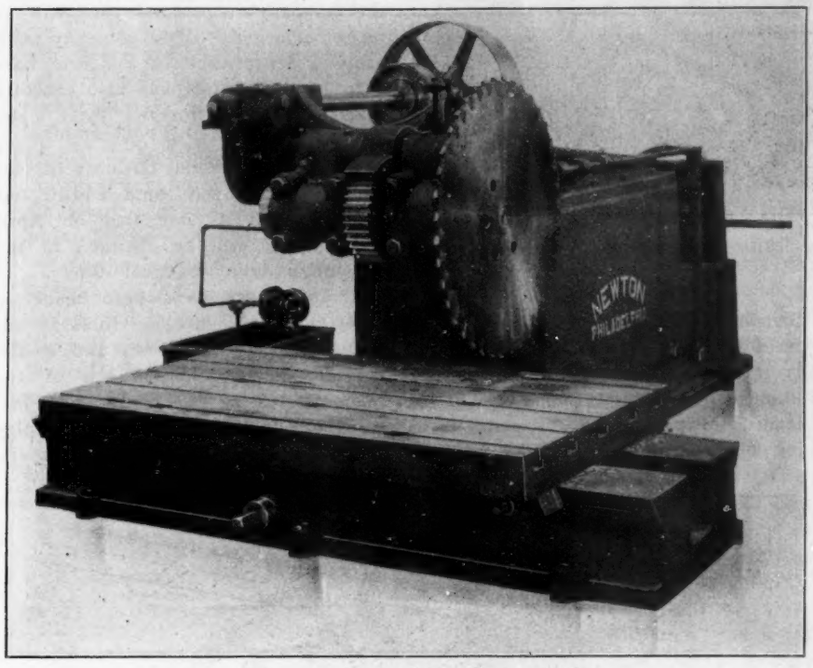


THE VICTOR PIPE CUTTING MACHINE.

be instantly set for cutting any diameter of pipe within the range of the machine. The machine occupies an area of 18 x 24 inches and is 24 inches high. Its weight is 210 pounds.

A NEW FOUNDRY COLD SAW CUTTING-OFF MACHINE.

The accompanying illustration shows a new design of steel foundry cold saw cutting-off machine especially designed for using the inserted tooth saw blade. This machine was built by the Newton Machine Tool Works, Inc., Philadelphia. The machine as shown carries a 32-inch "Premier" inserted tooth saw blade held and driven by six countersunk head through bolts. These are drawn up by nuts back of a flange on the spindle. This construction permits the saw blade being used flush against the side of the casting.



NEWTON STEEL FOUNDRY COLD SAW CUTTING OFF MACHINE.

The spindle is 4½ inches diameter and 27½ inches long. It is driven through spur gearing from a phosphor bronze worm wheel and hardened steel worm, which are encased and run in oil. The machine as shown is belt driven, but the same type can be used with a motor drive. The spindle is carried on a ram of great rigidity, which has been developed through the experience of the builder with machines of this class. This ram has a continuous variable automatic feed with quick return and is provided with adjustable stops which can be set to disengage the feed at any predetermined point. The feed has a range up to 1½ inches per minute, which latter, however, can seldom be used owing to the limitations of the saw blade. The spindle head has an automatic feed of 18 inches. Hand adjustment is provided and a pump, piping and attachments are furnished for lubrication of the cutters. The capacity of the machine is for gates or risers up to 9 inches diameter. The work table is 3 feet wide 5 feet long and has a cross adjustment of 24 inches. The approximate net weight of the machine is 1,600 pounds.

Information Wanted.—O. M. Becker, Berwyn, Ill., is desirous of receiving from makers and users of high speed steel, the most recent and available information concerning the following points: Composition, brands on the market including names and address of maker, recent interesting performances as to actual speed and cut, endurances and savings effected, experience in wood cutting and in metal cutting other than iron and steel. This information is desired for the purpose of revising Mr. Becker's contributions on the subject of high speed steel which are being prepared for issue in book form.

A NEW PORTABLE RIVET HEATING FORGE.

The development of the pneumatic riveter to its present-day efficiency and the wide range of its applications have created an extensive field for the forge of a type sufficiently light to admit of easy removal from one floor of a building under construction to another, or about ship yards, boiler shops, etc. The Houck Mfg. Co., corner Richards street and Hamilton avenue, Brooklyn, N. Y., which has been building rivet heating forges

FIG. 1—ONE TYPE OF HAUCK PORTABLE RIVET FORGE.

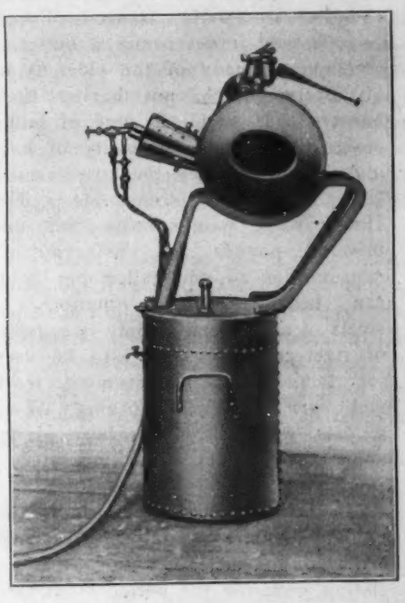


FIG. 2—ANOTHER TYPE OF HAUCK PORTABLE RIVET FORGE.

for some time, has brought out two models presenting some interesting features.

In designing these forges foremost consideration was given to securing the complete and uniform combustion of the oil. To accomplish this the burner is provided with its own combustion chamber, by means of which complete atomization is accomplished. In this way it overcomes a difficulty common to many of the older types of forges, which, not having their burners thus supplied, were of bulky design through the necessity of having their magazines built sufficiently large to allow atomization. The Houck forge weighs only about one hundred pounds and, with an oil consumption of one gallon per hour, can heat a sufficient number of rivets of any size to supply two gangs of riveters. They can also be used for tempering and annealing work and even for light forging. Two models, which have just been placed upon the market, are illustrated.

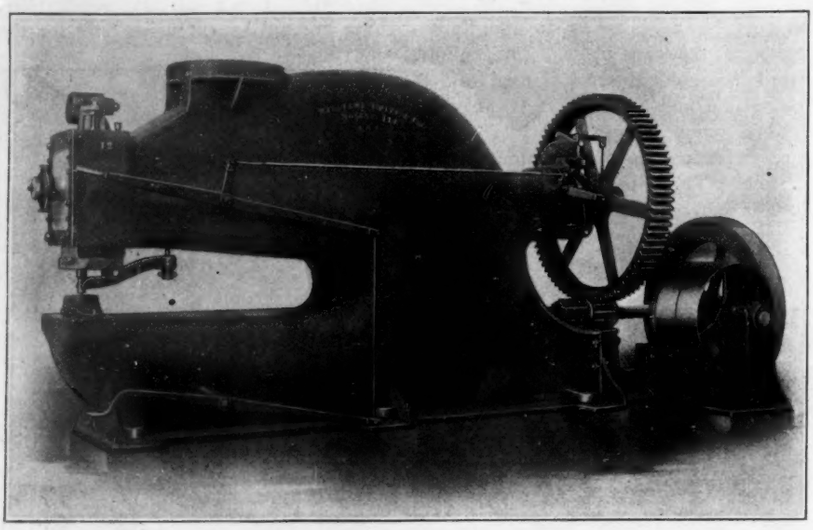


FIG. 1—SIDE VIEW OF LARGE PUNCH BUILT BY WILLIAMS, WHITE & CO.

Idle Car Decrease.—A recent bulletin issued by the committee on car efficiency of the American Railway Association, covering the period from Oct. 30, 1907, to Feb. 19, of this year, shows a decrease of 23,415 cars, the first reduction of surplus cars since the end of October. Reports from Ohio, Indiana and Michigan district show a decrease of idle cars from 98,429 on Jan. 22 to 89,602 on Feb 19. The decrease in West Virginia, Virginia and the Carolinas is from 17,842 to 16,699. Kentucky, Tennessee and Mississippi show an increase from 10,209 to 17,861.

LARGE PUNCH BUILT BY WILLIAMS, WHITE & CO.

Williams, White & Co., Moline, Ill., have just completed building for the Standard Oil Co. a gigantic punch, front and side views of which are shown in the accompanying illustrations. The machine weighs 63,000 pounds and is intended for punching heavy plates, having a capacity to punch holes up to 2 inches in 1⅛ inch plate. The punch has a massive appearance enhanced by the used of a cored section rather than girder frame. The throat is cut deep to permit the handling of large plates, the distance from the center of the punch to the back of the throat being 66 inches. The punch is operated by a right angle direct-motor drive with spur gear and pinion and is equipped with an adjustable automatic stop clutch.

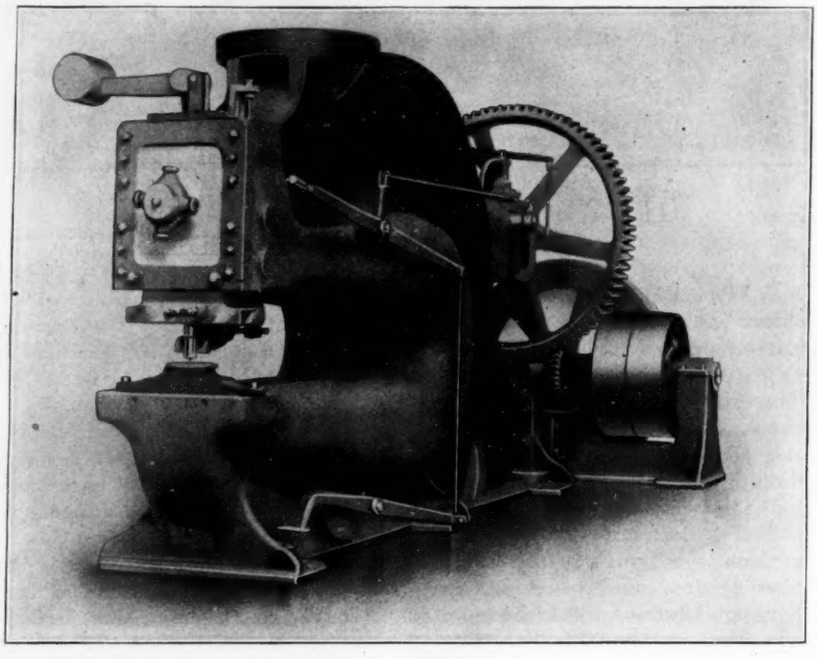


FIG. 2—FRONT OF LARGE PUNCH BUILT BY WILLIAMS, WHITE & CO.

EXPANSION OF THE CINCINNATI IRON STORE CO.

The Cincinnati Iron Store Co. has acquired nearly half a block of property adjoining its plant. This gives the company practically the entire block bounded by Front, Freeman, Sargeant and Carr streets. Another railroad switch will be put in and the company's structural yard will be much enlarged. The company will carry a larger line of concrete bars than heretofore. It has also recently taken the agency for the Tyler Tube & Pipe Co.

The growth of the business of this company has been rapid and it has so diversified its line that on April 1 the name will be changed to the Cincinnati Iron & Steel Co.

Arrangements have been made to carry a line of machine tools in addition to the other lines and a display room for this branch of the business will be one of the new features of the concern. In this display room will be found planers, shapers, lathes, punches and shears, bending rolls, grinders, etc.

The realty purchased has a frontage of 300 feet on Front street and is 250 feet in depth. The purchase price was about $75,000.

COUNTRY AROUSED BY COLLINWOOD CATASTROPHE

General Movement in the United States and Canada for Fireproofing of School Buildings and Other Public Structures — Extensive Improvements Already Under Way

Emphatic demand that the lesson of the Collinwood School disaster, in which 174 lives were sacrificed, be applied to public, private and parochial schools, public halls, and in fact to all high buildings in which numbers are housed or employed is being made by the public from one end of the country to the other. No matter how small the city, nor how large, the school authorities as well as the building authorities and fire marshals' offices have taken prompt action toward the inspection of all such buildings, and voluminous reports have been made upon their condition, as well as to the improvements that must be made to safeguard the lives of the children and adults which frequently crowd them.

Fires which have occurred since that at Collinwood—some of them occurred the day following, and since then with more or less frequency—emphasize the demand for greater safety in public building construction. In almost every state in the union, school buildings have been closed down because they were found veritable fire traps. State legislatures, as in Ohio and Kentucky, have undertaken drastic legislation covering the discovered defects in the building laws. Careful inspection has shown that in very few of the hundreds of cities and towns which have reported are buildings which have wooden stairways equipped with so much as even fire escapes on the outside. From the very day following the Collinwood catastrophe for ten days, school buildings and city poor houses throughout the country, at the rate of one and sometimes two a day, caught fire and burned, entailing the narrow escape of thousands of school pupils and more or less helpless adults.

The urgency of immediate action being taken by public school and other municipal authorities to safeguard the lives of old and young in crowded buildings has thus been shown. In many cities school buildings have been ordered closed, and in some cases warrants asked for those in authority over the buildings because of absolute failure to observe even the ordinary precautions of building construction or equipment. In scores of schools, doors have been found locked and in hundreds exits have been found opening inward. Worse than all, in many cases where the only exits were reached by means of wooden stairways, there were neither fire escapes on the outside, axes or sledges within reach nor even temporary fire apparatus in the building.

Inspections of the Collinwood ruins, as well as like buildings within the past few weeks, brought forth opinions from the highest authorities in building construction and fire fighting. The opinion of all is that the only safe building is of fireproof construction. Secondly, the inefficiency of the fire drill in case of panic in buildings not equipped with fire escapes was strikingly demonstrated last week in two instances, the lives of 800 children being involved. Two types of exterior fire escapes are recommended. One is known as the detached, or enclosed, fire escape, separated from the building proper by brick walls, and the other is the ordinary ladder or stair fire escape, hung on the exterior of the building. Authorities recommend that each floor have several of such escapes, to which entrance is had by a door instead of the ordinary window. Recommendation is made for the equipment of the interior of all buildings with stand pipes, fire extinguishers and axes, subject to rigid and regular inspection.

Boards of education and of city aldermen in such cities as New York, Pittsburg, Cleveland and Chicago have asked the co-operation of the fire department authorities in specially detailing experienced firemen as fire wardens for public school inspection. On March 17 the board of education of Cleveland voted three bond issues, aggregating $450,000, for repairing old buildings, equipping a technical high school and constructing and equipping elementary schools for the better protection of teachers and pupils. In the old buildings, each room will be considered as a unit, with doors leading directly into the school yard from the first floors, and on the second and third floors doors will lead directly to outside fire escapes. The director of schools is instructed to prepare plans of all open joist and frame buildings and the alterations needed to make them fire proof.

GENERAL INVESTIGATION

Is Being Made in New York and Other Eastern Cities.

New York, March 16.—As a result of the Collinwood distaster, a general investigation is being made to determine whether or not school buildings now occupied in New York and other eastern cities are not properly safeguarded against fire. In the case of New York City, this inquiry is being conducted in accordance with a resolution passed by the board of education March 11, which directed that any buildings found in unsafe condition should be immediately closed.

Some little time will be required to complete this investigation, but it is not expected that results will make necessary any extensive abandonment of buildings now occupied or any great amount of safeguarding work, in the way of adding fire escapes, etc. The New York school buildings are regularly inspected and precautions against fire have been kept up to a high degree of efficiency. For this reason, a relatively small amount will cover any immediate expenditures for iron and steel materials for use in fireproofing and in providing fire escapes. The sum of $50,000 has been set aside for immediate installations of additional fire escapes.

In Philadelphia 20 inspectors from the bureau of buildings inspection are going over the school houses of that city. Their report will be announced within a short time. This report will probably state that a number of antiquated structures should eventually be replaced by fireproof

buildings and that this work should be done as soon as finances will permit, but will also declare that in most instances all possible precautions are now being taken. In Philadelphia, therefore, it is unlikely that any large amount will be spent in the early future as a result of the lesson at Collinwood.

Several smaller cities in the New York district are making careful inspections of their school buildings and in isolated cases immediate improvements are being ordered. For the most part, however, the buildings are being found in satisfactory condition and practically no expenditures will result. In certain places meeting halls and auditoriums are also being investigated. Jersey City is finding a larger number of unsafe structures than most other investigating cities.

GENERAL MOVEMENT

Throughout Indiana to Safeguard Lives of School Children.

Indianapolis, Ind., March 16.—Since the Collinwood fire disaster there is a general movement throughout Indiana to improve school buildings and make them safer. In some instances, new buildings involving fireproof features are to be constructed. So far the work has not progressed because of the short space of time, but important developments will likely come within the next month.

Local officials are to have a conference within the next ten days to discuss the condition of local buildings, following an inspection of every school building in the city. The majority of the local buildings are comparatively new, and, while not strictly fireproof, are known as slow burning structures.

The city already has plans under way for two new buildings, but these had been planned before the Collinwood fire. However, some changes in the plans are possible to make the proposed buildings still safer. Fire escapes are to be provided for a number of buildings soon and iron stairways are to be placed in others.

At Columbus, fire escapes will be ordered for one building at an estimated cost of $450. One building in Evansville is to be condemned as a fire trap and a new one to be erected this summer. Dunkirk has arranged to build a $25,000 building and the New Castle school board is now asking bids for equipping three school buildings with fire escapes.

OHIO STATE AUTHORITIES

Are Moving Toward Making School Buildings Fireproof.

Columbus, O., March 16.—Aside from the deep sympathy and aid that has been extended by the state authorities and public generally, to the grief stricken parents and friends of the unfortunate school children who lost their lives in the Collinwood school fire, there is a practical feature to the distressing disaster that is being taken up manfully, and in a broad-minded way, by the authorities of the state of Ohio, the governor, the legislature and the state inspector of public buildings and seconded by the boards of education over the state in a determined effort to make impossible a repetition of the disaster.

In carrying out the plans that are being laid by the state authorities, there is perhaps no class that will be more closely affected than the manufacturers of iron and steel building products and the manufacturers of other fireproof building materials. These industries are getting ready to carry out as expeditiously as possible the plans of the authorities.

Recommendations of John H. Morgan, chief inspector of workshop and factories, whose jurisdiction extends over all public and semi-public buildings, are incorporated in a house bill that has been introduced by Mr. Reynolds, member from Cuyahoga county, requiring that all school buildings erected in the state in the future be absolutely fireproof and with proper exits, etc. This means that the buildings will be of steel construction, with cement floors, at least on the first floor.

A member of the state department of workshops and factories, said to a representative of THE IRON TRADE REVIEW that all school houses in the state are being inspected as rapidly as possible by the department, with a view to recommending changes that will as nearly as possible prevent a repetition of the Collinwood disaster. He said:

"As matters now stand, we have no power by law to compel boards of education to make any changes in their present buildings or specify the material to be used in new buildings; but this is not necessary, as we are receiving hundreds of requests from boards of education over the state to inspect their buildings and recommend changes. The school boards are all showing every inclination to cooperate with this department in making all necessary changes in the interest of fire protection.

"The bill requiring fireproof school buildings in the future will, of course, not apply to existing buildings and it is to these that we are giving our immediate attention, so that they can be repaired and revised during the summer vacation.

"Our policy in general for these changes is to require direct exits from each school room by means of steel constructed stairways and fireproof walls. Where it is possible to construct these stairways inside the buildings without destroying the buildings, this will be recommended. If this be not practicable, outside, steel constructed stairways with fireproof walls will be recommended. Changes in school buildings are receiving our almost exclusive attention just now, but as soon as the work on them is well under way, we shall turn our attention to public and semi-public buildings and endeavor, by means of fire escapes and other devices and improvements to make them as free from fire disaster as possible."

The 40 school houses of Columbus are being inspected by representatives of the state department, accompanied by J. E. Aston, superintendent of school buildings in Columbus, and as soon as the inspection is completed, their report and recommendations will be acted upon by the Columbus board, possibly at a special meeting. According to reports in the offices of the state commissioner of common schools, there are 13,311 school buildings in the state. Of this number, 2,168 are in city, village and special school districts and are practically all of brick or stone construction and more than one story high. The remaining 11,000 buildings are township schools, many of which are brick, and more than one story high. Practically all the school buildings of the state that are more than one story will be subject to some revision along fire protection plans and this will require a large iron and steel tonnage.

Written instruction regarding the remodeling and equipping of school buildings of Ohio with fire escapes and other means of protecting school children in case of fires and for controlling fires were given to each of the deputy inspectors of the state department of workshops, factories and public buildings, by their chief, John H. Morgan, Saturday. The deputies started on a thorough and systematic inspection of the school buildings of the state today.

In accordance with the instruction inspectors will require all buildings of two stories or more to be equipped with fire escapes. These, where there is sufficient ground to permit it, are to lead away from the buildings to the ground, but where this is not practical, they will be allowed to range along the walls in the ordinary way. Each room on all floors is to be provided with a direct exit, opening out onto a fire escape.

The fire escape stairways, where they extend away from the buildings, are to be of iron or steel construction, resting on iron pipe columns, not less than 3 inches in diameter and thoroughly braced. The latter are to rest on solid stone or concrete footings. At the option of the boards of education inside tower stairways may be substituted for the fire escapes. The first floor exits are to open onto balconies with short stairways leading to the ground.

Other requirements are also ordered, such as stand-pipe and hose of standard size and quality with connections on each floor, and where water power is lacking, barrels of salt water are to be kept on each floor. All doors are to open outward and the room in which the heating apparatus is located is to be absolutely fireproof.

THOROUGHLY AROUSED.

Milwaukee Will Equip Its Buildings With Fire Escapes.

Milwaukee, March 14.—The Collinwood disaster has thoroughly aroused Milwaukee to the fact that the necessary fire protection must be had at any cost.

Bids are now being received by the Milwaukee school board for fire escape equipment to be installed on the public schools of the city. About 20 school buildings are to be equipped, some with two fire escapes, others with only one. All buildings holding school sessions on third floors are to made absolutely safe, and the school board is determined to use every precaution. Supt. Pearse, of the board, estimates that $30,000 will probably be spent for fire escapes alone and only the best are to be erected. Just at present the members of the board are busy looking over the field, securing prices and investigating the different styles now upon the market. Secretary F. M. Harbach, of the board, was in Louisville, Ky., examining the circular escapes that are being turned out by one of the Louisville firms. The board is also negotiating with numerous other firms and no contracts will be made until the field is thoroughly examined.

Milwaukee has been witnessing rather an unique situation in regard to the installing of the fire escapes on the schools. Immediately after the Collinwood disaster, Mayor Becker issued an order forbidding school to be held on third floors of any building until the school board had erected the necessary fire escapes. The order was served on the school board which refused to close school in the many third story buildings because it was believed that it would be an injustice to the 4,000 children who would be kept out of school. The board agreed to erect the escapes as quickly as possible, but absolutely refused to close the schools until the work should be done. Fire escapes were installed on two or three of the unprotected buildings and pensioners of the Milwaukee fire department are now stationed at a few of the 20 unprotected schools, acting under the orders of the school board and arranging the minor details of fire protection. Mayor Becker has been urged to have the father of some pupil in the schools apply for an injunction to close the sessions on third floors, but he now says that he is satisfied as long as action is being taken by the board. Supt. Pearse, of the school board, maintains that the schools are now absolutely safe and that the required fire escapes will be erected as quickly as possible. More attention is now being given to the fire drills and janitors are employing every precaution. Chief Clancy is daily taking the school authorities to the different school buildings and designating where the escapes are to be erected, and every possible haste is to be employed in making the schools as absolutely safe as possible.

As soon as the public schools are adequately equipped with fire escapes, the Milwaukee building inspector will begin a general crusade against many public, semi-public buildings and office structures in the city. Most of the parochial schools are without fire escapes and several of the high office buildings are totally unprotected. The Railway Exchange building, 12 stories in height, is devoid of a single fire escape.

Through the agreement signed by 90 per cent of his creditors, George Westinghouse has been granted a three-year extension of time on his personal accounts, estimated to be about $8,000,000.

ACTIVE CAMPAIGN

Before Canadian Legislatures to Compel Fire Equipment in Schools.

Toronto, Canada, March 14.—As a result of the Collinwoood disaster, the question of insuring fire safety of schools is receiving much attention in all parts of Canada, and extensive alterations in school buildings are likely to be made. A circular has been issued by Hon. R. A. Pyne, minister of education for Ontario, requiring that fire drills shall be practiced by all schools where the buildings are over two stories in height. It also states that the department will insist on the equipment of schools with fire escapes and the provision of adequate exits with the doors opening outwards. School inspectors are instructed to see that these regulations are carried out. The matter will shortly come before the Toronto Board of Education.

In Quebec province a bill will shortly be introduced in the legislature compelling the equipment of schools with fire escapes, to connect with outside iron galleries on every floor above the first, running completely round the building wherever possible, with one or more staircases from one to the other on each side of the building. The width of the galleries, slope and width of the staircases and height of steps are to regulated by the measure. The Society for the Protection of Women and Children in Montreal is conducting an active agitation in favor of the bill.

EXAMINE READY EXITS.

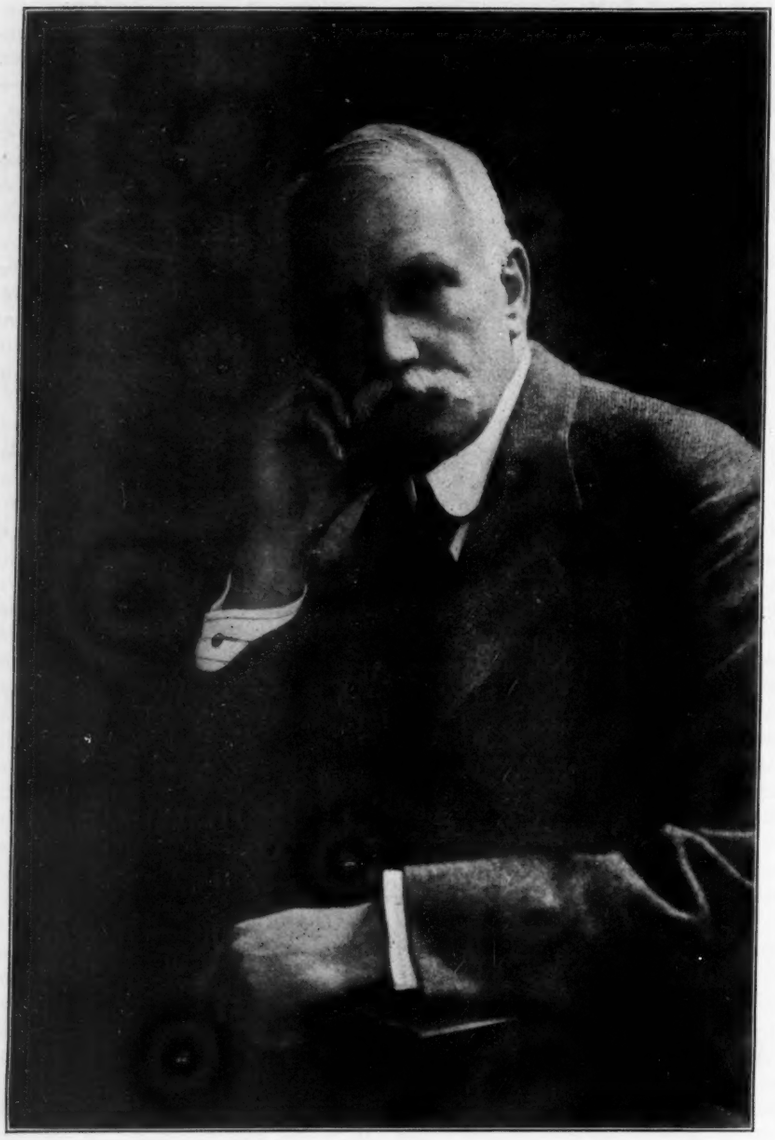
Worcester, Mass., March 16. — In Worcester and elsewhere throughout Massachusetts and New England, there is a general tendency and movement to look thoroughly into the matter of ready exists from school buildings, in view of the lamentable disaster at Collinwood. This undoubtedly will call for more or less new material, but at this writing nothing definite can be given.

Cincinnati manufacturers estimate that between 8,000 and 10,000 boys and girls under the ages of 16 and 18 years, respectively, will be thrown out of work in that city as soon as the new state child labor law goes into effect. Already a number of firms have found it expedient to replace the boys and girls in their employ with older employes and one company estimates it will have to discharge 20 boys from its office force.

DEATH OF JAWOOD LUKENS.

Jawood Lukens, president of the Longmead Iron Co., of Conshohocken, Pa., died March 10, aged 65 years.

Mr. Lukens was born March 8, 1843, in Lebanon county, Pa., where his father had a charcoal forge. He was educated at a private school in Norristown, Pa., and at the Polytechnic College in Philadelphia. Thence he graduated as a civil engineer in 1864, having, meantime, served in the Pennsylvania militia in the emergency calls of 1862 and 1863—first in the 11th regiment and second in the Grey reserve regiment of Philadelphia. After his graduation he was for a time engaged with an engineer corps, in surveying a route for the Pan Handle railroad in West Virginia and Ohio, and later was engaged in surveying in the oil fields of Pennsylvania. In 1867, he took a position in the employ of Alan Wood & Co., subsequently. He belonged to a family of Pennsylvania iron masters and was named after J. A. Wood, his maternal grandfather, who was one of the earliest manufacturers of iron in the Schuylkill valley. J. A. Wood's descendants are the owners of the Alan Wood Iron & Steel Co., and of the John Wood & Bros.' Iron Co., of Conshohocken. Jawood Lukens was the youngest son of Lewis A. Lukens, an original partner in the Alan Wood Co. The son took up a part of his father's interest in that company in 1873, but in 1881 withdrew and started the Longmead Iron Co. of Conshohocken with which afterwards was incorporated the Conshohocken Tube Works, of which Mr. Lukens was one of the founders. These companies have grown to large dimensions and they have had much prosperity.



JAWOOD LUKENS.

Mr. Lukens served his community in the town council and on the school board, was long a director of several banks, and for many years he was treasurer and practically manager of the Conshohocken water works. He was a member of the American Institute of Mining Engineers; the Engineers' Club of Philadelphia; the Franklin Institute, the Union League, the Art Club and the Manufacturer's Club.

In all these capacities and in his own business he was capable, assiduous, clearsighted, and in possession of the confidence and esteem of his fellow citizens. In his private life his lofty character, his refinement, his consideration for others, his unblemished integrity warmed into affection the feelings of those persons with whom he came in contact. A remarkable member of a remarkable family, his death at the age of 65 years is deeply mourned by a wide circle of friends.

Demand for Stokers.—The Westinghouse Machine Co., builder of the Roney mechanical stoker, reports for the first two months of this year a good demand for stoker equipment. Perhaps the most interesting orders have come from cold storage companies; the Merchants Ice & Cold Storage Co., Cincinnati, is installing three equipments; the Montgomery Ice & Cold Storage Co., Jenkintown, Pa., two equipments, and the Holt Ice & Cold Storage Co., Indianapolis, Ind., the same number. Another municipal lighting station at Troy, O., operated by the board of public service, has adopted Roney stokers, and the Pennsylvania Light, Heat & Power Co., Allegheny, Pa., operating a large central station at that place, increases its present equipment with two stokers of large capacity. The Mutual Union Brewing Co., Alliquippa, Pa., is installing three equipments, and the Alpha Portland Cement Co., operating a number of plants in the country, one of the largest size.

Advances Scored in Industrials

Enlarged transactions on the New York market wtih higher prices for the more active issues were the features of the week. Several peculiarities in the amounts and varieties of stocks characterized the market as professional and the advances as due almost wholly to manipulation. If the object of the manipulation was to advance prices, it was accomplished, for following the rise in the more active industrials the general market responded. United States Steel common gained 3¾, preferred 2¾; Republic Iron & Steel common advanced 1½, preferred 4; American Locomotive common 2¾, and so on, down the list. Three stocks, Reading, Union Pacific and Steel common, furnished over half of the week's total volume of business. The improvement in the condition of the money market both at home and abroad is unmistakably better. The United States comptroller's abstract showing the condition of 6,698 national banks on Feb. 14 last, published during the week, shows the favorable change that has taken place in the domestic market and indicates that this change is still in progress. The Bank of England rate of 3½ per cent was maintained, its reserve being the highest held at this season for many years. The most important bond transaction of the week was the sale of $5,000,000 New York state 4 per cent highway improvement bonds. The subscriptions approximated $80,000,000 and the premium realized was considerably higher than that received for the $50,000,000 New York City bonds last month. The New York bank statement Saturday made a better showing than indicated by preliminary estimates. While the actual cash reserve decreased $438,700, the surplus increased $529,100, and the total surplus now stands at $30,665,075, as against $3,033,100 a year ago, and $5,865,125 two years ago. The actual totals of clearing house banks show that loans increased $2,066,700 and deposits $4,586,400. The percentage of actual reserve was 27.82, an increase of 0.08 per cent. Non-member banks and trust companies of Greater New York declared loans increased $1,258,400 and deposits $956,700. The percentage of reserve was 26.5, a decrease of 0.5 per cent. Bank clearings for the week ending March 12 throughout the country aggregated $2,100,384,000, or 4 per cent under last week and 35 per cent below this week last year. Business failures for the week ending March 12 number 276, against 287 last week, and 186 in the like week of 1907. The total number of shares sold during the week was 4,018,750, compared with 2,036,915 last week and 9,360,400 the same week last year. The total amount of bonds sold exclusive of government bonds, aggregated $11,853,000, compared with $7,985,000 last week, and $14,024,000 the same week last year.

The American Car & Foundry Co. declared its regular quarterly dividend of 1 per cent on common stock and 1¾ on preferred stock, payable April 1; the Cambria Iron Co., its semi-annual dividend of 2 per cent, payable April 1; the American Smelting & Refining Co., reduced its quarterly dividend on common to 1 per cent and declared 1¾ per cent on its preferred, payable respectively April 15 and April 1. The directors of the Barney & Smith Car Co. passed the regular quarterly dividend of 2 per cent on preferred, payable March 15. The directors of the Calumet & Hecla Mining Co. declared a quarterly dividend of $5 a share as against the last quarterly dividend of $10. Union Switch & Signal dividend of 3 per cent each on common and preferred declared.

THE LEADING INDUSTRIAL SECURITIES.

	Clos'ng Quo Mar. 14	Changes in Week	Date 1908 Ann. M't'g	Stock Outstanding	Dividend Basis	Dividend Last Declared	Dividend Date Last Div. Pay.
Allis-Chalmers	6⅝	+ ⅞	Sept. 3	19,820,000			
Allis-Chalmers pr	17¼	+2⅝		16,150,000	7 cum	1¾ Q.	Feb., 1904
American Can	5	+ ⅛	Feb. 3	41,233,300			
Am. Can pr	49	+2¾		41,233,300	7 cum	1¾ Q.	Jan., 1908
Am. Car and Fdy	30⅜		June 25	30,000,000		1 Q.	Jan., 1908
Am. Car and Fdy pr	89	+ ¾		30,000,000	7 n. c.	1¾ Q.	Jan., 1908
American Loc	38¾	+2¾	Oct. 20	25,000,000	5	1¼ Q.	Feb., 1908
American Loc. pr	91	+ ⅛		25,000,000	7 cum	1¾ Q.	Jan., 1908
American Ship	45	−5	Oct. 14	7,500,000	4	1	Dec., 1907
American Ship pr	94½	+ ⅜		7,900,000	7 n. c.	1¾ Q.	Jan., 1908
Am. Steel Foundries	5⅛	− ¼	Oct. 6	15,810,000			
Am. Steel Foundries pr	30			17,240,000	6 cum	2½	Aug., 1904
Barney & Smith	50		June 2	2,000,000	4	1 Q.	Sept., 1907
Barney & Smith pr	105			2,500,000	8 cum	2 Q.	Sept., 1907
Bethlehem Steel	14	+1	April 7	14,862,000			
Bethlehem Steel pr	38½			14,900,000	7 n. c.	¾ Q.	Feb., 1907
Cambria Steel	29⅜	+ ¾	March 17	45,000,000*	6	1½ S. A.	Aug., 1907
Cambria Iron	45¾	+ ¾		8,468,000*	4	2 S. A.	Apr., 1904
Chicago Pneumatic Tool	21¾	−1¼	Feb. 17	6,145,800	4	1 Q.	Oct., 1907
Colorado Fuel	20	+3	Oct. 19	34,235,500		3½	Apr., 1902
Crucible Steel	5½	− ¼	Oct. 21	24,578,400			
Crucible Steel pr	37½	+2		24,436,500	7 cum	1 Q.	Dec., 1907
Empire Steel	8	+4	Feb. 26	2,281,400			
Empire Steel pr	40	−5		2,500,000	6 cum	3 S. A.	Jan., 1907
Fay & Egan	100		Feb. 18	1,000,000	6	1½ Q.	July, 1907
Fay & Egan pr	110			1,000,000	7 cum	1¾ Q.	Aug., 1907
General Electric	121½	+2¼	May 12	65,167,400	8	2 Q.	Jan., 1908
Harbison-Walker	10	−2½	Jan. 20	18,000,000		½	Oct., 1907
Harbison-Walker pr	65	−5		9,600,000	6 cum	1½ Q.	Oct., 1907
International Pump	24½	+2½	June 2	17,787,300		1	Apr., 1905
International Pump pr	73⅝	+4⅞		18,835,000	6 cum	1½ Q.	Nov., 1907
Lackawanna Steel	28		March 11	34,971,400			
Lake Sup. Corp.	5¼	+1	Oct. 7	40,000,000			
New York Air Brake	65⅞	+1½	June 18	8,012,500	8	2 Q.	Oct., 1907
Niles Bement-Pond	100		Feb. 5	8,500,000	6	1½ Q.	Dec., 1907
Niles Bement-Pond pr	100			2,000,000	6 cum	1½ Q.	Feb., 1908
Otis Elevator Co	23		March 16	6,156,600		1½ S. A	Oct., 1907
Otis Elevator Co. pr	75			6,449,500	6 n. c.	1½ Q.	Oct., 1907
Penn. Steel	60	+1	May 11	10,750,000			
Penn. Steel pr	90	+2		16,500,000	7 n. c.	3½ S. A.	Nov., 1907
Pittsburg Coal Co	8¾	+ ¾	Feb. 10	28,297,600			Nov., 1906
Pittsburg Coal pr	40	+1		27,248,800	7 c.	3½	Apr., 1905
Pressed Stl. Car	22⅛	+1⅛	Feb. 19	12,500,000		5	Aug., 1904
Pressed Stl. Car pr	79	+8		12,500,000	7 n. c.	1¾ Q.	Feb. 1908
Pullman	150½	+ ½	Nov. 11	100,000,000	8	2 Q.	Nov., 1907
Railway Stl. Spring	32¼	+3¼	March 5	13,500,000	4	2 S. A.	Oct., 1907
Railway Stl. Spring pr	80	+4½		13,500,000	7 cum	1¾ Q.	Dec., 1907
Rep. Iron & Steel	18¼	+1⅛	Oct. 21	27,191,000			
Rep. Iron & Steel pr	71	+4		20,416,900	7 cum	1¾ Q.	Oct., 1907
Sloss-Sheffield	51¼	+7	March 11	10,000,000	5	1¼ Q.	Dec., 1907
Sloss-Sheffield pr	92			6,700,000	7 n. c.	1¾ Q.	Oct., 1907
U. S. Pipe & Fdy	20¼	+1	June 24	12,500,000	4	1 Q.	Dec., 1907
U. S. Pipe & Fdy. pr	67⅛	+3⅛		12,500,000	7 n. c.	1¾ Q.	Dec., 1907
U. S. Steel	34⅝	+3¾	April 20	508,302,500	2 n. c.	½ Q.	Dec., 1907
U. S. Steel pr	98	+2¾		360,281,100	7 cum	1¾ Q.	Nov., 1907
U. S. Steel 5's	91⅝	+2⅞		463,798,000	5	5 A.	
Va. Iron, Coal & Coke	49	+2	Nov. 17	9,073,680			
Westinghouse Elec	40		June 24	23,933,200*	10	2½ Q.	Oct., 1907
Westinghouse Air Brake	93		Oct. 6	11,000,000*		5 Q.	Jan., 1908

Par value of shares, $100, except those starred (*), $50.

Copper Stocks.

Boston.—North Butte mining closed 53¾, a net gain of 3⅛; Calumet & Arizona closed 106, a net gain of 6; Butte Coalition closed 20¾, a net gain of ⅝; Quincy Mining, 85, a net gain of 3; Calumet & Hecla closed 635, a net gain of 34.

New York.—Amalgamated Copper closed 57⅝, a net gain of 6.

NEWS FROM MANY INDUSTRIES

New Buyers:—

The Labeling Machine Co., Cincinnati, has been incorporated by E. B. Hanna, F. D. Goodhue, J. M. Campbell, F. B. Beinkamp and F. J. Reynolds, with $10,000 capital.

Edward H. Bardes, Charles H. Resor, William Kummel, Charles H. Vogel and Jerome D. Creed have incorporated the E. H. Bardes Range & Foundry Co., Cincinnati, with $60,000 capital.

The Automatic Boiler Cleaner Co., Logansport, Ind., has been incorporated by Charles H. Wilkinson, Isaac C. Gray and Frank B. Wilkinson, with a capital of $20,000.

The Southern States Smelting Co., with a capital of $200,000 has these incorporators: Robert R. Zell and H. G. Bains, Birmingham, Ala., and J. B. Stagg, Pratt City, Ala.

The Pittsburg Steel Tire Co., Pittsburg, Pa., with a capital stock of $25,000, has these incorporators: Charles Bonini, Salvatore Calandra, Henry Valentini, Caesar Lombardi and I. Baccky.

The American Scrap Iron & Machinery Co., 1311 Unity building, Chicago, to manufacture machinery, has been incorporated by Michael Libonati, Louis Berg and Samuel J. Andalmann, with a capital of $32,000.

M. Reischman & Sons Inc., Southhampton, N. Y., for the manufacture of tools and machinery, with a capital of $100,000 have been incorporated by George M., John and Henry Reischman, 362 Second avenue, New York City.

The Empire Machine & Electric Co., capital stock $10,000, has these incorporators: Treasurer, E. Ernest Rose, Swissvale, Pa.; directors, James R. Bell and Benjamin H. Thompson, Pittsburg, Pa., and E. Ernest Rose, Swissvale, Pa.

The Schubb & Caplan Scrap Iron & Metal Co., capital stock $9,000, has these incorporators: Treasurer, Elias Schubb, 62 Stephenson street, Pittsburg; directors, Elias Schubb and Morris Caplan, Pittsburg, and C. W. Ward Eichler, Greensburg, Pa.

The incorporation of the Stewart Wrench & Mfg. Co., Albany, N. Y., has been brought about by David Stewart, Robert W. England and Vernon B. Crounse, Schenectady, N. Y. The company will manufacture nut and pipe wrenches, and has a capital stock of $30,000.

The incorporation of the Fort Pitt Motor Mfg. Co., with $50,000 capital, has been filed by Treasurer Henry M. Schmitt, 5 E. South Diamond street, North Side, Pittsburg. Directors, Henry M. Schmitt, Pittsburg, and Julius Sturtevant and George C. Rothweiler, New Kensington, Pa.

The Heindel Mfg. Co., New York City, dealers in manufacturers', builders and mill supplies, engines and machinery, with $200,000 capital, has been incorporated by William F. Kintzing, Hanover, Pa., Mois H. Avram, 225 Fifth avenue, and Charles Frecman, 35 Nassau street, New York City.

The American Diatomite Co., New York City, to prepare ores for the market and deal in machinery, etc., with a capital stock of $450,000, has these incorporators: John C. Houston and John W. King, 21 Park Row, New York City, and Bert S. Clark, 281 Stuyvesant avenue, Brooklyn.

The incorporation of the Automatic Weighing Machine Co., New York City, to manufacture weighing machines, with a capital of $200,000, has been secured by George H. Mallett, Copake, N. Y.; Charles G. Benedum, 150 Nassau street, New York City, and Herbert Mallett, Westchester, N. Y.

The Machinery Designing & Mfg. Co., New York City, for the manufacture of engines, boilers and tools, has these incorporators: C. Augustus Meier, Orange, N. J., Alexander C. Connor, 465 W. 157th street, New York and Robert Connor, 128 Miller avenue, Brooklyn. The capital stock is fixed at $18,000.

The incorporation of the Clark Multiple Engine Co., of New York City, with a capital of $25,000, has been filed by DeWitt C. Hayes, of White Plains, N. Y., Raymond E. Maben, 174 Monroe street, Brooklyn, N. Y., and George G. Ehrhardt, 349 East Fifty-second street, New York City, to manufacture engines, tools and implements.

The Keystone Metal Culvert Co., New York City, to manufacture and deal in metal culverts, sheet metals, etc., with a capital of $25,000 has been incorporated by Edward D. Cronin, 889 Union street, Brooklyn, N. Y.; Fred Knowlton, 638 East 139th street, and M. A. Lyons, 503 Amsterdam avenue, both of New York City.

The Harshbarger Concrete Form Construction Co. has been incorporated by, president, Parrot Gregory Harshbarger, 50 William avenue; treasurer, Henry Edward Jenkins, 23 Bernard avenue, and clerk, William Morris Murray, 15 Walnut street, all of Hyde Park, Mass. The company will manufacture collapsible sheet steel forms for construction work, with a capital of $25,000.

The Phoenix Wire Works, Watervliet, N. Y., for the manufacture of copper wire and cable, has been incorporated by Carl J. Mellin, James A. Allardice, Robert Waugh, of Schenectady, with $50,000 capital.

The Blake Machine & Foundry Co., Carmon, N. Y., to manufacture metal work with a capital of $150,000, has been incorporated by Frank O. Blake, Schenectady; Leland M. Griswold and M. C. Foley, Worcester, Mass.

The American Industrial Corporation, to handle machinery of all kinds, with a capital of $100,000, has been incorporated by president, Chester Marr; treasurer, Arthur E. Call; clerk, Harvey S. Hall Jr., all of Gloucester, Mass.

The Standard Smelting & Refining Co., New York City, to manufacture, smelt and refine metals, with a capital of $15,000, has been incorporated by Simon Levy, Stamford, Conn.; David Wolff, 53 107th street, New York, and David Sager, 117 Ellery street, Brooklyn, N. Y.

The Chryst Laundry Machine Co., Camden, N. J., mechanical engineer, tool maker and brass founder, with a capital of $50,000 has these incorporators: William G. Chryst, Thirty-second street and Callow Hill street; Walter Hunsperger, 1227 North Sartain street; Walter Kintsman, 33 East Girard avenue, and George W. F. Keys, 2112 Master street, all of Philadelphia, Pa.

New Construction:—

John Vertin is building a machine shop and engine room at St. Joseph, Mo.

A. J. Harper has purchased land at Portland, Ore., for $13,000, upon which he plans to erect a big brick building for use as a brass foundry.

C. D. Gordon, of Oskaloosa, Ia., is making plans to build a brick building at Shenandoah, Ia., where he is establishing an iron foundry.

The Norfolk Southern railway is having plans prepared for railroad shops at Chocowinity, N. C., at an estimated cost of $300,000.

The plant of the Benton Harbor Malleable Iron Works, Benton Harbor, Mich., has been completed and was recently placed in operation.

The United Engineering & Foundry Co., Pittsburg, has taken out a building permit at Youngstown, O., for the construction of an addition to the Lloyd Booth plant, to cost $5,000.

The general contract for constructing a one-story galvanizing plant for the Kansas City Galvanizing & Mfg. Co., Kansas City, Mo., has been let to Flanagan Bros. for $9,000.

The New York Central railway is making extensive improvements and alterations at the West Albany, N. Y., locomotive, car shops and round houses. The improvements will take some time to complete.

Ground has been broken for the proposed steel plant of the Tropenas Steel Co., New Castle, Del., by Truitt & Bro., contractors. It is expected that the structural material will be on the ground April 1.

The Oklahoma Implement Mfg. Co., Oklahoma City, Okla., recently incorporated by D. B. Lackey, A. B. Snodgrass and A. G. Hurd, with a capital stock of $150,000, is having plans prepared to erect a foundry building for the manufacture of implements, at a cost of $35,000.

The Pueblo Iron Foundry, recently incorporated by T. H. Devine, A. H. Moll, F. W. Preston and others, has purchased a building of the Steel Wheel & Wagon Co., Minnequa, Colo. The company plans to improve the building and install machinery as soon as possible for the manufacture of iron and steel castings.

The Columbian Brass Foundry Co., Freeport, L. I., recently incorporated by George Christian and others, has bought the plant of Robert A. Patrick and contemplates putting up a new building 20 x 80 feet for foundry work. The company will manufacture propeller wheels and boat fittings as a specialty. Robert A. Patrick will remain with the company as general supervisor. The contract for the erection of concrete buildings has been awarded by the company.

The Smith Mfg. Co., Bessemer, Ala., recently incorporated with $10,000 capital by W. J. Long, president; J. N. Reeves, vice president; W. A. Smith, general manager, and C. S. Smith, secretary and treasurer, has established a stove foundry at Bessemer, Ala., and work on the building is being started. While the principal business of the new company will be the building of stoves and ranges, it will also do a general foundry business.

The William B. Pollock Co., Youngstown, O., is forwarding to the Schaghticoke Electric & Power Co., Schaghticoke, N. Y., 750 tons of penstock to be used in the construction of the new plant. The Pollock Co. is also dismantling the old Grace stack of the Brier Hill Iron & Coal Co., Youngstown, and is daily shipping material to be used in the construction of the new furnace.

The large stove foundry which B. B. Cohen, of Sheffield, is constructing at Florence, Ala., is nearing completion. The building is 100 x 255 feet, with an annex 50 x 100, and an ell 50 x 50 feet, making it one of the largest stove plants in that district. Patternmakers are making patterns for the plant, as Mr. Cohen proposes to start operation at the earliest date possible.

General Industrial Notes:—

The town of Coshocton, O., on March 11, raised $150,000 by selling lots, and by a bonus of $100,000 secured the big new pipe mill of James B. Clow & Sons, Chicago.

The Emery Steel Co., Gadsden, Ala., is now prepared to furnish open hearth steel bars and other specialties. It has leased the plant of the Weller Rolling Mill & Forge Co., in which to manufacture.

Isaac Loeb, who owns one-third of the stock, has asked for a receiver for the Henderson Machine Co., Henderson, Ky. He charges that the business of the company is being run at a loss.

A 50-mile gale which prevailed throughout the state of Michigan March 7, blew in the south end of the galzanizing plant of the Valley Wind Engine Co., at Bay City, and blew down a number of smoke stacks and damaged the roofs of several other industrial plants.

Three thousand men were put to work at the four big Detroit, Mich., stove plants, March 9. Nearly twice as many other hands could not be placed at this time. The manufacturers are, however, endeavoring to take back their old hands in preference to employing new men.

Announcement is made that the Hampden Machine & Screw Co. will put its new plant in operation at Springfield, Mass., April 1. The company, which had been operating for some time in another Massachusetts town, has been reorganized and $60,000 of Springfield capital invested.

The Akron Clutch Co., including patents in the United States and Canada, machinery and good will, has been purchased by the Williams Foundry & Machine Co., Akron, O., and its equipment will be moved to the Williams plant. The business will be continued under the name of the Akron Clutch Co.

At the annual meeting of the Sloss-Sheffield Steel & Iron Co., the board of directors was reduced from 12 to 11 members by the retirement of E. W. Rucker. Henry Parsons was elected director to succeed his father, George Parsons, deceased. The reelection of the other directors followed.

Victor B. Wooley was named by the federal court at Wilmington, Del., March 11, trustee for the Union Iron & Steel Co., recently declared bankrupt. The concern, which has plants at Ironton, O., Big Stone Gap, Va., and at other places, was chartered in Delaware. Its debts are said to exceed $100,000.

The Sycamore Foundry Co., Syramore, Ill., has been declared bankrupt by the federal district court and the American Title & Trust Co. named receiver. The petition for a receiver was filed by creditors claiming accounts valued at $12,050. The recent financial stringency is given as the cause.

Two hundred steel cars built by the Western Steel Car & Foundry Co. at its Anniston, Ala., plant were recently shipped from the port of Mobile for the Panama canal, where they are to be used on the dumps. The steel shapes were made in the rolling department of the United States Steel Corporation at Bessemer, Ala.

The Trussed Concret Steel Co. is shipping from its plant at Youngstown, O., to San Francisco 250,000 feet of triangular studding, 500,000 feet of railroad metal and 40,000 yards of ribbed lath. The company recently made some large shipments abroad to be used in building construction in France and elsewhere.

The city of Philadelphia has awarded contracts for the pumping machinery for the filtration system as follows: The Snow Steam Pump Co., for two 5,000,000-gallon horizontal cross compound engines and pumps for the Roxborough plant, $78,000; the Bethlehem Steel Co., for two similar engines for the Belmont filter plant, $88,200.

At the annual meeting of the stockholders of the Lackawanna Iron & Steel Co. in the company's general offices at Donaghmore, Pa., these directors were re-elected: E. A. S.

Clarke, Moses Taylor, Thomas C. Clarke, C. H. McCullough Jr., and Captain A. M. Patch. The company's five furnaces at Lebanon and Cornwall and the coke ovens at Colebrooke are idle.

The largest casting ever poured in Los Angeles, Cal., was recently made at the Llewellyn Iron Works. It weighed 11½ tons, is to be shipped to the factory of the Pacific Beet Sugar Co., at Corcoran, Cal., and will be used as a vacuum pan. Seven similar pans will be made and installed in the evaporation section of the factory, each costing approximately $2,000.

The LaFollette Coal, Iron & Railway Co. has leased 20,000 acres of iron ore land in Blount county, Tenn. Of this land 19,000 acres is located about 12 miles east of Marysville and the other 1,000 acres about seven or eight miles south of Marysville. The company has been doing some extensive prospecting on the new acquisition and plans important railway construction to tap the ore lands.

The Sterling Alternating Ignition Co., Binghampton, N. Y., was recently incorporated to manufacture timers for gasoline engines, an alternating system of ignition for automobiles and some minor parts for automobile and engine use. The company possesses a plant at present with capacity required for some years, so that no new equipment or material for construction will be required.

Charles A. Bentley was named receiver for the Oswego Boiler & Engine Co., Oswego, N. Y., of which A. D. Granger, of New York City, is president. The petition of involuntary bankruptcy was filed March 7 by local creditors with claims aggregating $1.350. The officers of the company have declined to make a statement. The company was organized about three years ago and had been manufacturing boilers, tanks and stacks.

The Knudsen-Von Kohen Mfg. Co., Chicago, recently incorporated, for the manufacture, under patents, of valves which dispense with stuffing boxes, has located its factory at Dalton, Ill., 17 miles from Chicago. The plant includes a pattern shop 20 x 20 with the necessary machinery; brass foundry 40 x 40, with two furnaces and a capacity of 750 pounds daily; machine shop 40 x 70, gasoline engine, milling machine, turret, etc.; plating and polishing shop 20 x 30, with office, stock room, etc. The output of the shop, which is in operation in all departments, will be 100 radiator valves or their equivalent daily. Its policy of co-operative operation, the company believes, will insure economies in manufacture and consequent benefit to the consumer.

The new shops of the Hocking Valley railway, Logan, O., are ready for operation in all departments, but they are being operated in only a small way, to take care of minor repairs, until the company is ready to put a complete force of men to work. This will not be done until the business increases sufficiently to warrant it.

At the annual meeting of the Union Switch & Signal Co., Pittsburg, March 10, George Westinghouse was re-elected president; H. G. Prout chosen vice president and general manager and James Johnson, secretary and treasurer. The following board of directors was chosen: George Westinghouse, Robert Pitcairn, Wm. McConway, Geo. C. Smith, Thos. Rodd, H. G. Prout and John B. Jackson.

The Chicago Bridge & Iron Co., which has the contract for repairing the Fourth street viaduct in Columbus, O., has been given a 30-day extension of time, from April 1 to May 1, in which to complete the work. It has been discovered that the viaduct was in much worse condition than was at first supposed, as the iron work was badly rusted and the expense will exceed the estimate of $5,200 by about $2,000. The work is being done without interrupting street car traffic.

Trade Notes:—

The John F. Allen Co., 372 Girard avenue, New York City, has arranged agencies abroad for the sale of the Allen riveting machine as follows: Robert Lindenthal, at Berlin, Germany; Samuel Ranko, at Cherson, capital of Odessa, and Eduardo Carrasco, at Santiago, Chili.

Adreon & Co., Security building, St. Louis, recently appointed sales agents of the Steel Car Forge Co., Pittsburg, Pa., has secured for the company an order of 95,000 tie plates from the United Railway Co., of St. Louis. The plates are made of 5-16-inch open hearth steel.

William L. Davis announces that he has established himself independently as lubrication engineer and specialist in all that pertains to the management of lubrication costs in plants in which lubricants are a factor of the operating expense. He has established offices at 93 Broad streeet, Boston. Mr. Davis has had 15 years experience in the business, including 10 years in the lubricating department of a large oil refining company and other years as an oil inspector.

John D. Morgan has removed his offices for the practice of patent law from Union Square to the St. Paul Building, 220 Broadway, New York.

R. S. Stangland has been placed in charge of the construction office of Muralt & Co., at New Fort Lyon, Colo., and will superintend the erection of a complete lighting, heating and power plant which this firm is building for the government hospital at that place.

Fires:—

The plant of the Allegheny Foundry Co., Pittsburg, sustained damage to the amount of about $2,000 by fire March 12.

The coke washer, tipple, engine house and laboratory of the Colorado Fuel & Iron Co.'s mine at Sopris, Colo., burned March 15, entailing $150,000 damage.

TRADE PUBLICATIONS.

SHAFTING—The Pittsburg Shafting Co., Detroit, is distributing a stock list calling attention to its stock shafting, square and hexagon cold drawn steel, soft cold drawn screw stock and flat cold drawn steel.

WATERTUBE BOILERS—The Murray Iron Works, Burlington, Ia. Catalog No. 60. 9 3-8 x 11 2-8 inches. 38 pages. A very handsome catalog with a crash finish Bristol cover, with the title "Safety Watertube Boilers" printed in embossed letters. The contents are printed on a fine quality of coated paper in three colors —gray, black and buff. The many forms and types of watertube boilers included in this catalog are designed to eliminate danger of explosion, accessibility to facilitate cleaning, simplicity in form, etc. The design, materials used, construction, etc., are carefully detailed and a number of cuts showing buildings in which watertube boilers are installed are given. Some of the types illustrated include the Murray watertube boiler, with suspension rigging set in brick work, fire front-Murray watertube boiler, large size watertube boiler, with two drums, front header and drums, large and small size watertube boiler, steam drum watertube boiler and numerous other illustrations.

ELECTRIC PYROMETERS.—William H. Bristol, 45 Vesey street, New York city. Catalog 20, relating to electric pyrometers for blast furnaces designed and developed for every-day practical service in many different industrial and scientific processes, particularly valuable and suitable for use in connection with blast furnaces. The simple construction and fundamental principle are shown in the illustrations. The different types described and illustrated include the indicating, recording and combination portable electric pyrometers for temperatures of hot blast and top gas of blast furnaces. The interior details of the patented recorder, scales and charts for blast furnace outfits, multiple indicating outfits, protection cases for recording instrument, fire ends and leads are illustrated and described and specifications and prices of special outfits, directions for ordering and a partial list of companies using electric pyrometers are presented.